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March 20, 2008

Mr. Tim Fleury
Rhode Island Department of Environmental Management
Office of Waste Management
235 Promenade Street
Providence, Rhode Island 02908

RE: Final Remedial Investigation Report
Site 04 – Potential Past Disposal Area; Lincoln AMSA 68 (G)
Smithfield, RI

Dear Mr. Fleury:

KEMRON Environmental Services (KEMRON), on behalf of the U.S. Army Environmental Command, is transmitting three copies of the Final Remedial Investigation (RI) Report for the Site 04 Potential Past Disposal Area at the Lincoln Area Maintenance Support Activity 68 (G) located in Lincoln and Smithfield, RI. The report has been prepared in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The Army's intent is to achieve site closure under CERCLA and achieve Response Complete under the Defense Environmental Restoration Program for this portion of the AMSA 68 (G) U.S. Army Reserve property.

The purpose of the RI Report is to summarize the results of investigations conducted, present the human health risk assessment, and provide a recommendation that either more work is required or No Further Action is appropriate. The RI Report concludes that there is no unacceptable risk to human health or the environment from exposure to site soil and groundwater based on current and reasonably foreseeable future land use, and therefore No Action under CERCLA is appropriate for the Site 04 Potential Past Disposal Area. The Final RI Report includes an appendix containing responses to RIDEM review comments on the Draft Final RI Report.

Please note that a Public Notice will be published in the Providence Journal to announce that this RI Report will be available for public review at the Lincoln Public Library and the East Smithfield Public Library. In accordance with CERCLA requirements, public comments received on the RI Report will be addressed in the Responsiveness Summary portion of the Decision Document to be prepared by the U.S. Army.

Should you have any questions please contact Lou Ehrhard of KEMRON at 847-266-1350, ext. 10, or Mark Stelmack of MACTEC at 207-828-3592.

Sincerely,
KEMRON Environmental Services, Inc.

Tracy Bergquist
Program Manager

Enclosure Final Remedial Investigation Report for Site 04 Potential Past Disposal Area Lincoln Area Maintenance Support Activity 68 (G), Smithfield, RI.

cc: Richard Mendoza, USAEC
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94th Regional Readiness Command
AMSA 68 (G), USAR, Lincoln, RI
Final Remedial Investigation Report
Site 04 - Potential Past Disposal Area
Contract # W911SO-04-F0017

Submitted to:
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KEMRON ENVIRONMENTAL SERVICES

MACTEC

March 20, 2008

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LIST OF ACRONYMS

AMSA	Area Maintenance Support Facility
amsl	above mean sea level
AOC	area of concern
ATSDR	Agency for Toxic Substances and Disease Registry
BTEX	benzene, toluene, ethylbenzene, xylenes
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
DERP	Defense Environmental Restoration Program
DRO	diesel range organics
DSERTS	Defense Site Environmental Restoration Tracking System
EPCs	exposure point concentrations
EPH	extractable petroleum hydrocarbon
ft	feet
GA GO	RIDEM Groundwater Objectives for a GA classified aquifer
GA LC	RIDEM Leachability Criteria for a GA-classified aquifer
GC/FID	gas chromatograph/flame ionization detector
GFPR	guaranteed fixed-price remediation
gpm	gallons per minute
GRO	gasoline range organics
GZA	Goldberg-Zoino and Associates
HHRA	human health risk assessment
HEAST	Health Effects Assessment Summary Table
I/C DEC	RIDEM Industrial/Commercial Direct Exposure Criteria
IDW	investigation-derived waste
IRIS	Integrated Risk Information System
KEMRON	KEMRON Environmental Services, Inc.
kg	kilogram
L	liter
LUC	land use control
MACTEC	MACTEC Engineering and Consulting, Inc.
MADEP	Massachusetts Department of Environmental Protection
mg	milligram
MRL	Minimum Risk Level
NCEA	National Center for Environmental Assessment
NCP	National Oil and Hazardous Substances Pollution Contingency Plan

LIST OF ACRONYMS, continued

OSWER	Office of Solid Waste and Emergency Response
PAH	polynuclear aromatic hydrocarbon
PDA	Potential Past Disposal Area
PID	photoionization detector
PPE	personal protective equipment
ppm	parts per million
PPRTVs	provisional peer reviewed toxicity values
QAPP	Quality Assurance Project Plan
QA	quality assurance
QC	quality control
RCRIS	Resource Conservation and Recovery Information System
Rfd	reference dose
RI	Remedial Investigation
RIAC	Rhode Island Airport Corporation
RIDEM	Rhode Island Department of Environmental Management
RRC	Regional Readiness Command
SAP	Sampling and Analysis Plan
SI	Site Investigation
SIR	Site Investigation Report
STSC	Superfund Technical Support Center
SVOC	semivolatile organic compound
TOC	total organic carbon
TPH	total petroleum hydrocarbons
UCL	upper confidence limit
UICP	Underground Injection Control Program
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Command
USAR	United States Army Reserve
USARC	United States Army Reserve Center
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	underground storage tank
VOCs	volatile organic compounds
VPH	volatile petroleum hydrocarbons

Section 1.0 Project Background

1.1 Introduction

MACTEC Engineering and Consulting, Inc. (MACTEC), in partnership with KEMRON Environmental, Inc. (KEMRON) under contract to the United States Army Environmental Command (USAEC) through the APG Directorate of Contracting, has conducted a Remedial Investigation (RI) at Site 04 - Potential Past Disposal Area (PDA, Site) located on United States Army Reserve (USAR) 94th Regional Readiness Command (RRC) property in Smithfield, Rhode Island. The purpose of this RI Report is to characterize the nature and extent of contamination, determine whether or not additional environmental restoration efforts are needed, and to make recommendations for further actions. This report presents the results of the RI field investigations conducted at Site 04 in January 2006 and May-June 2007.

1.2 Regulatory Framework

The U.S. Army, as the lead agency, is conducting response actions at Site 04 in accordance with the Defense Environmental Restoration Program (DERP), which requires that these activities be conducted in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Additionally, the Army's intent is to achieve site closure under CERCLA and achieve Response Complete under DERP for Site 04.

The U.S. Army Reserve Center (USARC) is not on the National Priority List (NPL) of CERCLA sites, but it is on the CERCLA inventory list of sites (CERCLIS ID No. RID0980520167).

This RI Report summarizes the results of the field investigation activities conducted at Site 04 in January 2006 and May-June 2007. The Soil and Groundwater Objectives identified in the Rhode Island Department of Environmental Management (RIDEM) Remediation Regulations (RIDEM, 2004) are being used as screening criteria during evaluation of Site data. Groundwater beneath the property is designated by RIDEM as GB, which indicates the groundwater may not be suitable for public or private drinking water use without treatment due to known or presumed degradation. However, as specified in the Remediation Regulations (RIDEM, 2004), the GB Groundwater Objectives are not applicable to sites where the contaminated groundwater poses a substantial likelihood of exceeding a surrounding GA Groundwater Objective. Since the Area Maintenance Support Facility (AMSA) 68 (G) facility abuts property with a GA-classified aquifer, the Site 04 groundwater data are screened against GA Groundwater Objectives (GA GO).

For data screening purposes, the analytical data within this report have been compared to criteria presented in RIDEM's Remediation Regulations (DEM-DSR-01-93, as amended February 2004), as follows:

Soil Data: screened against 1) RIDEM's Industrial/Commercial Direct Exposure Criteria (I/C DEC), and 2) GA Leachability Criteria (GA LC). The GA LC is applied only to those soils above the water table (in the vadose zone), and is applicable to Site 04 in accordance with Rule 8.02 A.ii of RIDEM's Remediation Regulations (RIDEM, 2004).

Groundwater Data: screened against GA GO.

This RI Report also includes a Human Health Risk Assessment (HHRA) for Site 04 that has been performed in accordance with CERCLA, the NCP, and applicable United States Environmental Protection Agency (USEPA) guidance. The results of the risk assessment provide the basis for recommendations presented in this RI Report.

1.3 Facility Location

The AMSA 68 (G) Facility is located in the North Central Industrial Park in Smithfield, RI (Note: the east portion of the property is located in the town of Lincoln; Lincoln, Rhode Island is the mailing address) (**Figure 1-1**).

1.4 AMSA 68 (G) Facility Description and History

The AMSA 68 (G) property is located on 4.01 acres in the town of Smithfield, Providence County, Rhode Island. The AMSA 68 (G) property is located within the North Central Industrial Park along the southern side of Albion Road (Rhode Island Route 123), approximately 500 feet northeast of Jenckes Hill Road. The geographic coordinates as referenced to the approximate center of the AMSA 68 (G) property are 41° 55' 22.9' north latitude and 71° 29' 10.1" west longitude. The United States Department of the Army is the current owner of AMSA 68 (G) property. Records at the town of Smithfield Tax Assessor's Office identify the property as part of Parcel No. 47A on Map No. 45. The property is abutted by Albion Road to the northwest and the North Central State Airport beyond, Pure Platinum LLC to the northeast, Sandvik Co./Madison Industries to the southeast; and an undeveloped wooded parcel to the south and southwest. **Figure 1-2** presents the facility layout.

The United States Department of the Army acquired two undeveloped parcels totaling 3.76 acres from the State of Rhode Island and a third parcel (0.25 acres) from United States Department of the Air Force in 1957. The AMSA 68 (G) facility was constructed on these three parcels in 1958 for the Department of the Army. At the time of its construction, the facility was designated as a Technical Site Support Facility for the seven original Nike Sites that comprised the Providence Defense Areas. Prior to 1958, much of the AMSA 68 (G) property was undeveloped or was occupied by farmland. Three buildings were constructed on the AMSA 68 (G) property: a maintenance building (main building), historically used for field maintenance repairs, direct exchange of repair parts and automotive, engineering, and signal support; a water pump house, historically used as a fire-suppression water delivery pump house; and a Quonset Hut, which was reportedly used for storage of oil, grease, petroleum, oil and lubricants (POL) and solvents. The maintenance building is still present on the facility. A 120,000-gallon underground reservoir, used as a component of the fire-suppression system (in conjunction with the fire-suppression pump house), was located to the east of the maintenance building (**Figure 1-2**). Water was pumped out of the reservoir, and the reservoir and pump house were demolished in November 2006. The Quonset Hut is no longer present on-site, but was located between monitoring well MW-13 and piezometers PZ-1 (**Figure 1-2**). No information regarding the dates of construction or removal of this building is available; however, records indicate that a building was removed from the property in 1960 and this date would substantiate a former employee's recollection of the Quonset Hut removal. The Quonset Hut area is designated as an area of concern (AOC)/Source 6.

Wastes generated on the Lincoln AMSA 68 (G) property during the 1960s and 1970s were primarily solvents used for degreasing, and waste oils. Spent solvents (kerosene was the primary solvent used, with acetone also used on-site) used in parts cleaning were stored in a 1,000-gallon underground storage tank (UST) located near the northern exterior corner of the maintenance building prior to off-site disposal (**Figure 1-2**). The UST was installed in 1985 and registered with the State in 1986. The UST was not used for solvent storage after 1972 (ENSR, 1993). The Army removed the UST in the early 1990s.

According to a representative of the Department of the Army, two floor drains located in the northern portion of the maintenance building were formerly connected to an oil/water separator and dry well system, located approximately 20 feet northeast of the eastern corner of the building. In a February 12, 1988 letter to RIDEM, a representative of the Department of the Army indicated that great care was taken at the AMSA 68 (G) facility not to dispose of waste oils or anything else directly into the dry well.

However, cleaning practices during early on-site operations, according to both facility personnel and past employees, included washing of the floors and rinsing off vehicles, with the rinsate going to the floor drains. In July 1991, in compliance with the RIDEM Underground Injection Control Program (UICP), the U. S. Army pumped the dry well of its contents (including wastewater and sludge), and severed and capped the connection between the oil/water separator and the dry well in September 1991 (Nobis, 2004). The oil/water separator and dry well area are designated as AOC/Source 1.

The on-site septic system, located along the northeastern property boundary, currently receives only sanitary discharge from the maintenance building. This system consists of a septic tank (and pump lift) and four connected seepage pits. During a 1989 pumping of the septic tank, an overflow occurred and facility personnel observed an oily sheen on the ponded water. The system was pumped of all resultant liquid and sludge material. Analysis of the sample collected from the septic tank indicated the presence of volatile organic compounds (VOCs). The septic system area is designed as AOC/Source 2 and Defense Site Environmental Restoration Tracking System (DSERTS) Site 13.

Throughout the course of its operations, several petroleum USTs have been present on-site. The active 6,000 gallon fuel oil UST, former waste oil UST, and the former 1,000 gallon gasoline UST, are designated as AOC/Sources 3, 4, and 5, respectively (**Figure 1-2**). The former gasoline UST location is also designated as DSERTS Site 05. A summary of petroleum UST information for the AMSA 68 (G) facility is presented as **Table 1-1**.

The Potential Past Disposal Area (PDA) site is an inactive, non-regulated former disposal area along the property line north of the AMSA building (**Figure 1-2**). The site is referred to as the "area of suspected surface contamination" in ENSR (1993) and Nobis (2002) inspection reports. The PDA is also designated as DSERTS Site 04.

1.5 Physical Setting

The 4-acre facility is comprised of several structures, sheds and parking areas (**Figure 1-2**). A large grassy area is present on the east portion of the property, while grass also borders the north and west perimeters of the property. Surface runoff is directed from the facility to storm water drainage ditches along adjacent Albion Road and the northeast boundary of the facility.

1.5.1 Topography

The Unites States Geological Survey (USGS) topographic map for the area (**Figure 1-1**) indicates that the facility is relatively flat at approximately 455 feet above mean sea level (ft amsl).

1.5.2 Regional Geology

The AMSA 68 (G) facility is located within the Narragansett Bay drainage basin, most of which lies within the Seaboard Lowland section of the New England Physiographic Province (ENSR, 1993). The valleys and plains of this region are typically underlain by glacial outwash deposits, ranging in thickness from a few feet to over 150 feet. The outwash deposits generally consist of thin beds of sand separated by finer grained materials, and interbedded locally with coarser grained deposits of sand and gravel. The outwash deposits are generally underlain by a layer of glacial till, consisting of an unstratified mixture of grain sizes ranging from clay to boulders. The till ranges in thickness from a few feet to over 100 feet, but is commonly about 20 feet thick. The upland areas of this region are underlain mostly by glacial till and in some places by exposed bedrock. Bedrock in the region is generally of Paleozoic age and consists mostly of granite, syenite, anorthosite, and other intrusive igneous rocks and metamorphosed sedimentary rocks consisting of gneiss, schist, quartzite, slate, and marble.

1.5.3 Regional Hydrogeology

1.5.3.1 Regional Hydrogeology

Sand and gravel in the glacial outwash deposits are the principal sources of groundwater in the region. Yields of most municipal and industrial wells completed in the outwash deposits in the region range from 10 to 1,000 gallons per minute (gpm), and average about 100 gpm. A secondary aquifer in the region is found in the bedrock, particularly in fractured metasedimentary rock. The range in yield of most municipal and industrial wells withdrawing groundwater from the bedrock aquifer in the Providence, Rhode Island area is 5 to 200 gpm, while the average yield is about 30 gpm. Wells completed in till generally yield less than 2 gpm, unless lenses of sand and gravel are penetrated.

1.5.3.2 Previous Hydrogeologic Data and Interpretations

The facility is situated on the north slope of a local topographic high point at an approximate elevation of 450 ft amsl. The peak of the high point is located approximately 1,500 feet south of the facility at an elevation slightly greater than 460 feet. Based on the topography of the ground surface, it appears that the facility is located in an area of possibly diverging groundwater flow (to the north, west, and east) (ENSR, 1993).

ENSR conducted three rounds of water level measurements during the site investigation. An initial round of measurements was made in the five existing monitoring wells on December 14, 1992, as a basis for locating the additional monitoring wells to be installed during the site investigation. Based on the preliminary and limited data obtained from the first round of water level measurements, groundwater appeared to be flowing in a northerly direction across the facility, at a horizontal gradient of approximately 0.5 feet per 100 feet. The average depth to groundwater, at this time, was approximately 1.2 feet below ground surface (bgs).

Following the installation of the new monitoring wells and piezometers at the facility, a second round of water level measurements was collected prior to groundwater sampling on February 10, 1993. At this time, depth to water level measurements were made in the five existing wells, three newly installed wells, and the two piezometers. The data obtained during this second round of measurements indicated a more complex pattern of groundwater flow. Based on these results, it appears that a groundwater divide is present in both the northeast and southwest portions of the facility, as northward flowing groundwater diverges to the east and west, respectively. In addition the average depth to groundwater during the second round of measurements was approximately 3.3 feet bgs. This represents an average lowering of the water table by approximately 2.1 feet over the two months following the first round of water level measurements. Actual decreases in water levels measured between the first and second rounds ranged approximately 1.4 feet in MW-4 to 3.2 feet in MW-1. The average horizontal gradient determined for the second round of measurements was approximately 1.5 feet per 100 feet (i.e., three times steeper than the first round) (ENSR, 1993).

A third round of water level measurements was made in both the existing and new monitoring wells, and piezometers, on March 25, 1993. The results of these measurements indicated the presence of a groundwater divide in the northeast and southwest portions of the facility. However, the average depth to groundwater determined for the third round of measurements was approximately 0.5 feet bgs. This represents an average rise in the water table of approximately 2.8 feet since the second round of water level measurements. Actual increases in water levels measured between the second and third rounds ranged from approximately 1.7 feet in MW-4 to 4.0 feet in MW-1 and MW-5. The average horizontal gradient determined for the third round of measurements was approximately 0.5 feet per 100 feet (i.e., approximately the same as for the first round).

Based on the three rounds of water level measurements, it appears that the facility is generally characterized by a very shallow water table, subject to fluctuations on the order of several feet. The propensity for diverging groundwater flow resulting from the facility's topographical location is supported by the water level data, which indicate the presence of a groundwater divide in the northeast and southwest portions of the facility, causing northward flowing groundwater to diverge toward both the east and west, respectively.

1.5.4 Surface Water

A local wetland (the Town Line Swamp) is located topographically downgradient of the facility at an approximate distance of 0.6 miles to the north. Surface water in this area flows past the east side of Woonsocket Reservoir No. 3 (at a distance of approximately 1.4 miles of the facility) and into the northward flowing Crookfall Brook (a tributary to the southeastward flowing Blackstone River). The facility is also located approximately 0.4 miles west of a tributary headwater stream of the southeastward flowing Moshassuck River. In addition, a tributary stream of the Woonasquatucket River is located at a distance of approximate 0.75 miles southwest of the facility. The Woonasquatucket River also flows southeastward and joins the Moshassuck River to become the Providence River at their confluence in the City of Providence.

Due to the flat topography, surface water flow on the facility is toward drainage ditches. The only potentially sensitive environment located on the property is a 0.15-acre wetland located in the southeast corner of the property (see **Figure 1-2**).

1.5.5 Climate

Rhode Island has a four-season climate, but weather is quick to change. Narragansett Bay and all coastal areas are generally cooler in summer and warmer in winter - when compared with the inland regions. Statewide, winter is chilly and wet, with some snow. Overall, January is the coldest month, with average high temperatures near 30 degrees. July and August are the warmest months, with average high temperatures in the low 80s. Hotter conditions are common inland. Annual precipitation averages near 45 inches, with slightly higher amounts in the rolling hills, to the west of Narragansett Bay.

1.5.6 Land Use and Demography

Historically, the area surrounding the AMSA 68 (G) property has been occupied by commercial and industrial facilities since the early 1950s. Prior to that time, the land use for the area was primarily forest, farmland, and residential. The land surrounding AMSA 68 (G) is currently zoned for commercial, industrial, and residential use.

Drinking water for the facility and immediate surrounding properties is supplied by the Smithfield Water Supply Board, which is located at the Smithfield Department of Public Works, 3 Sprague ville Road, Smithfield, Rhode Island. Public groundwater drinking water supply sources within a 4-mile radius of AMSA 68 (G) are presented in **Table 1-2**.

In May 2006, MACTEC conducted a records search at RIDEM for information on surrounding properties and the potential for contamination on those properties to impact soil and/or groundwater on the AMSA 68 (G) facility. Review of the records indicates that there is no recent information in RIDEM records to indicate that adjacent properties might be impacting the AMSA 68 (G) facility. The following paragraphs utilize information obtained form the RI Report (Nobis, 2004), the May 2006 RIDEM records search, and review of the on-line USEPA CERCLIS database to present information regarding adjacent and surrounding properties.

Current owners of adjacent properties include the State of Rhode Island, the Rhode Island Airport Corporation, Thyssenkrupp Materials Inc., National Glass Service Inc., and Pure Platinum LLC. **Appendix A** presents a map obtained from the Town of Smithfield, Rhode Island Tax Assessor's Online Database and a table summarizing the ownership of properties adjacent to AMSA 68 (G), current as of October 2006. **Appendix A** also contains a map indicating occupants of adjacent properties in 1993 (Source: Figure 2-3 of the 1993 ENSR Site Investigation Report). The North Central Airport for the State of Rhode Island is located directly across Route 123/Albion Road from the Lincoln Reserve Center. The AMSA 68 (G) facility is considered to be part of the North Central Industrial Park which was initially listed on the CERCLIS List as a site to be investigated (CERCLIS ID No. RID0980520167) on July 10, 1991. The facility is currently listed in the USEPA CERCLIS database as "Active". Active CERCLIS sites are sites at which site assessment, removal, remedial, enforcement, cost recovery, or oversight activities are being planned or conducted under the Superfund program.

The following facilities located in the industrial park have been listed as Archived Sites on the CERCLIS List:

Site Name	**CERCLIS ID**	**RCRIS ID**
Olin Hunt Specialty Products		RID981070923
Lincoln Dimensional Tubing (now AVNET Diecasting)	RID080811912	
Hedison Manufacturing (now Vistawall Architecture).	RID001198225	
Crossley Machine and Tool Co. (now Pure Platinum LLC)	RID987479516	RID001460534

The Archive designation indicates the site has no further interest under the Federal Superfund Program based on available information. USEPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. The Archive designation is removed and the site is returned to the CERCLIS inventory if more substantitive assessment and/or any cleanup work is necessary under the Federal Superfund program.

Other CERCLIS sites within one mile of the site are the Elm Street Dump, ID No. RID980520167, New England Container, ID No. RID048976732 and Old Jenckes Hill Road Disposal Area, ID No. RID981205818.

In 1981, RIDEM closed down all private wells in a half (0.5) mile radius of the Industrial Park after discovering groundwater contamination. In 1982, RIDEM delineated five plumes of VOC contamination south/southeast of the AMSA 68 (G) property. Four of the five plumes have been linked to the following local releases:

- Olin Hunt, manufacturer of photographic and microelectric chemicals had a faulty wastewater pretreatment system. The groundwater plume is believed to have affected 14 private wells with up to eight organic chemicals (xylene, benzene, chloroebenzene, ethylbenzene, toluene, dichloromethane, 1,2-dichlorethane and 1,1,2-trichloroethane). Olin Hunt is currently operating a pump-and-treat system on the property.
- Lincoln Dimensional Tubing, manufacturer of brass tubing operated improperly designed lagoons. The groundwater plume affected 20 wells with up to four organic chemicals (trichloroethene, 1,2-dichlorethane, bromodichloromethane, and dibromochloroemethane).
- Hedison Manufacturing, manufacturer of jewelry, released high density VOC air emissions, blamed for low levels of tetrachloroethene contamination.
- Faulty sewer line, located on Wellington Road, sealed in 1981, believed responsible for affecting 36 private wells with up to five organic chemicals (1.1.1-trichloroethane, trichloroethene, 1,1-dichlorethane, tetrachloroethene, and 1,1-dichloroethene.

The source of the fifth plume of contamination, made up of eight chemicals (including tetrachloroethene, 1,2-dichloroethene, trichlorofluromethane, 1,1-dichloroethane, and trichloroethene), has not been conclusively identified. This plume was found downgradient of the Speidel property; however, a RIDEM investigation of the Speidel site found only traces of four of the contaminants. Several other sites within the Industrial Park are also suspected by RIDEM of contributing to groundwater contamination. Review of AMSA 68 (G) historical and 2006 groundwater data indicates that these groundwater plumes do not have an impact on groundwater beneath Site 13.

The property adjacent to the AMSA 68 (G) property on the south/southeast is Thyssenkrupp Materials Inc. (formerly Madison A. Sandvic property). In 1989, Sandvic hired Goldberg-Zoino and Associates (GZA) to carry out a site investigation consisting of the installation of six groundwater monitoring wells plus the collection of 27 soil samples, four groundwater samples and one surface water sample. GZA determined that the groundwater flow at Madison A. Sandvic was in an east-southeasterly direction. Trace levels of volatiles were found in soil samples from three of the six boring locations. Trace levels of ethylbenzene, xylene and toluene were detected in the soil; these VOCs are typically associated with gasoline. The groundwater and surface water samples did not show any indications of gasoline associated compounds.

1.6 Previous Investigations

Available information for the USAR 94th RRC facility was previously presented in the Remedial Investigation Report completed by Nobis Engineering, Inc. (Nobis, 2004). Previous exploration locations are presented on **Figure 1-3**.

RIDEM's June 14, 2004 letter to the Department of the Army requested that the Nobis RI Report Summary Tables (i.e., Tables 5.2 and 5.3) be revised to include a comparison to RIDEM's GA Groundwater Objectives and GA Leachability Criteria. As the referenced tables were not available in their native electronic format, revisions to the tables have not been performed; however, MACTEC has compared the data in Tables 5.2 and 5.3 to the requested criteria. Tables 5.2 and 5.3 are provided in **Appendix B**. Comparison of the soil data in Table 5.2 to the GA Leachability Criteria results in the following samples with analyte concentrations exceeding the criteria:

- Benzene in sample MW-10-20-21' from the Former Waste Oil Separator and Dry Well
- Ethylbenzene, naphthalene, and TPH in sample NSB-3-6-8' from the Former Gasoline UST
- Naphthalene and total petroleum hydrocarbons (TPH) in samples TP-2G, TP-7G from the PDA

Comparison of the groundwater data in Table 5.3 of the 2004 Nobis RI Report to the GA Groundwater Objectives results in the following samples with analyte concentrations exceeding the criteria:

- Benzene, toluene, ethylbenzene, and naphthalene in monitoring well MW-10-from the Former Waste Oil Separator and Dry Well
- Benzene in monitoring well MW-9 from the Former Gasoline UST
- Benzene in monitoring well MW-8 from the PDA

The following paragraphs present the findings of previous investigations conducted at the Site.

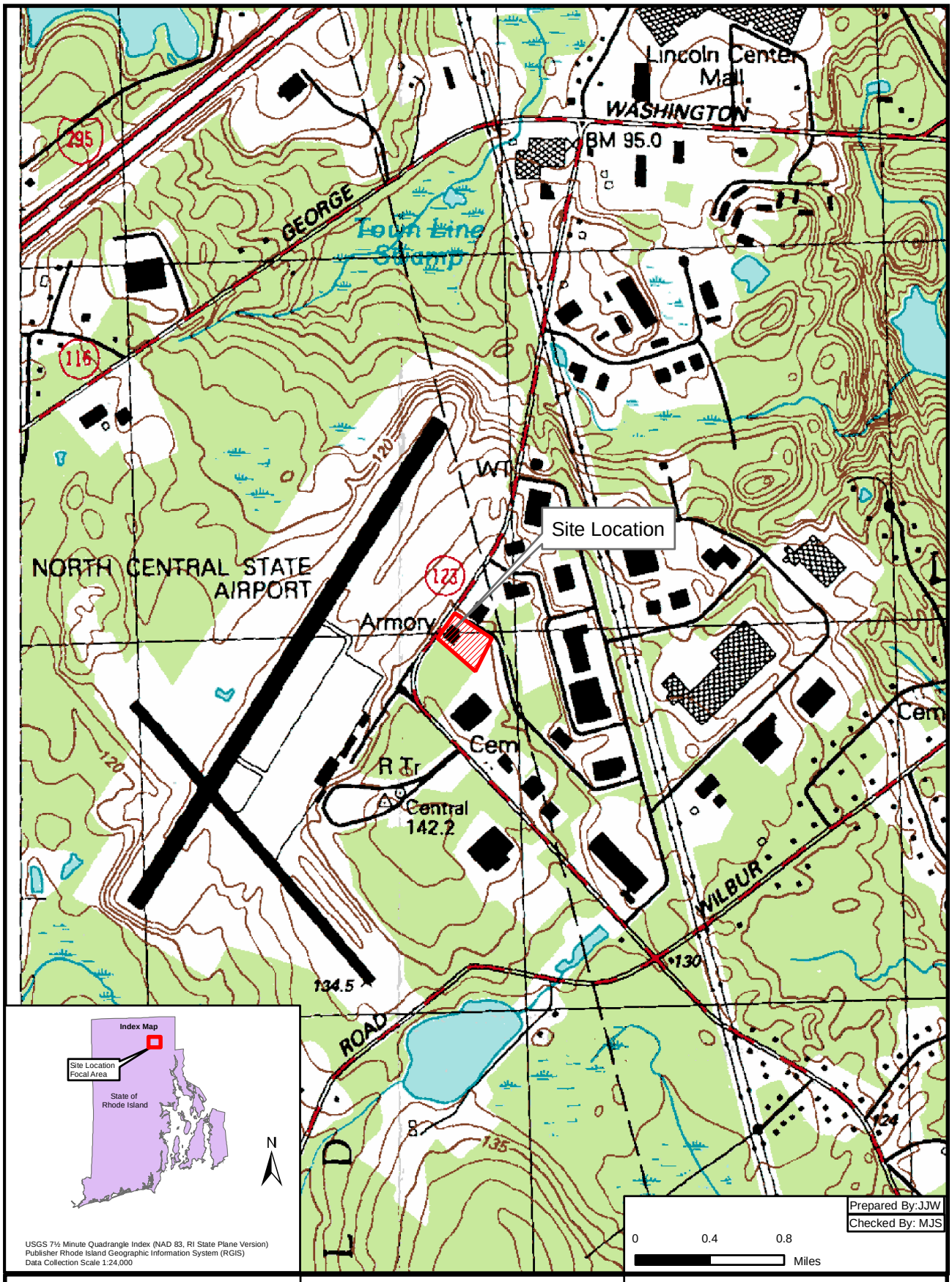
The Potential Past Disposal Area (PDA) site is an inactive non-regulated disposal area along the property line north of the AMSA building (**Figure 1-3**). The site is referred to as the "area of suspected surface contamination" in ENSR (1993) and Nobis (2004) reports. Analyses of soil samples collected by ENSR at the PDA indicated the presence of lead, benzene and naphthalene in surface soil at concentrations exceeding standards promulgated in the RIDEM Rules and Regulations for the Investigation and

Remediation of Hazardous Material Releases. Specifically, lead was detected in one surface soil sample at a concentration of 1,120 milligrams/kilogram (mg/kg), while the RIDEM Method 1 Direct Exposure Industrial/Commercial Criteria is 500 mg/kg; benzene was detected in one sample at 0.440J mg/kg, while the GA Leachability Criterion is 0.2 mg/kg; naphthalene was detected in one sample at 2.9 mg/kg, while the GA Leachability Criterion is 0.8 mg/kg (ENSR, 1993).

Analyses of soil samples collected during a remedial investigation (RI) conducted by Nobis on March 18 and 19, 2003, indicated that the concentration of TPH in samples collected from test pits TP-2 and TP-7 exceeded the Method 1 Residential Direct Exposure Criteria of 500 mg/kg, but were less than the Industrial/Commercial Direct Exposure Criteria of 2,500 mg/kg. The soil sample collected from test pit TP-2 contained a gasoline range organics concentration of 1,300 mg/kg. The soil sample collected from test pit TP-7 contained a combined gasoline range organics (340 mg/kg), motor oil/hydraulic oil organics (410 mg/kg), and unidentified hydrocarbons (160 mg/kg) with a TPH concentration of 910 mg/kg. There were no other compounds/metals detected at concentrations exceeding the RIDEM Method 1 Industrial/Commercial Soil Direct Exposure Criteria or the GA Leachability Criteria in soil samples collected at the PDA (Nobis, 2004).

BTEX compounds (benzene, toluene, ethylbenzene, and xylenes) were detected in a groundwater sample collected by ENSR on February 10, 1993, from monitoring well EW-2, formerly located within the PDA (this well has since been destroyed). Of these BTEX compounds, benzene and toluene exceeded the GA Groundwater Objectives. The concentrations of benzene and toluene were 7.4 milligrams per liter (mg/L) and 3.0 mg/L, respectively, while the GA Groundwater Objective for benzene is 0.005 mg/L and 1.0 mg/L for toluene. Based on the results of the sample collected from EW-2, migration of benzene and toluene in groundwater downgradient from the PDA and beyond the AMSA 68 (G) boundaries is possible. The source of the BTEX compounds in groundwater could potentially be Site 05 (Former Gasoline UST) or a drywell located between the UST and the PDA rather than the PDA itself. Except for a single reported cadmium concentration of 0.006 mg/L in one groundwater sample exceeding the RIDEM GA Groundwater Objective of 0.005 mg/L, only non-detectable or trace concentrations of metals in groundwater at the AMSA were noted by Nobis (Nobis, 2004).

Analysis of a groundwater sample collected from MW-8 (located downgradient and north of the former gasoline UST) during the RI performed by Nobis indicated a benzene concentration of 0.340 mg/L, which exceeds both the RIDEM GA and GB Groundwater Objectives of 0.005 mg/L and 0.140 mg/L, respectively. There were other petroleum-related compounds detected in this sample, including methylbenzene, total xylenes, alkyl benzene compounds, and naphthalene; none of these compounds were detected at concentrations above the GA groundwater objectives. Analyte concentrations were non-detect for samples collected from MW-1, located northwest of the PDA and MW-8, and MW-2, located northeast of the PDA and MW-8. Nobis concluded that MW-8 is located along the centerline of a groundwater contaminant plume associated with the former gasoline UST (Site 5). MW-8 is located approximately 100 feet downgradient of the former gasoline UST location. MW-1 and MW-2 bound the lateral extent of the contaminant plume. Based on the results of sampling conducted at MW-8, the leading edge of the plume may be off-site (Nobis, 2004).

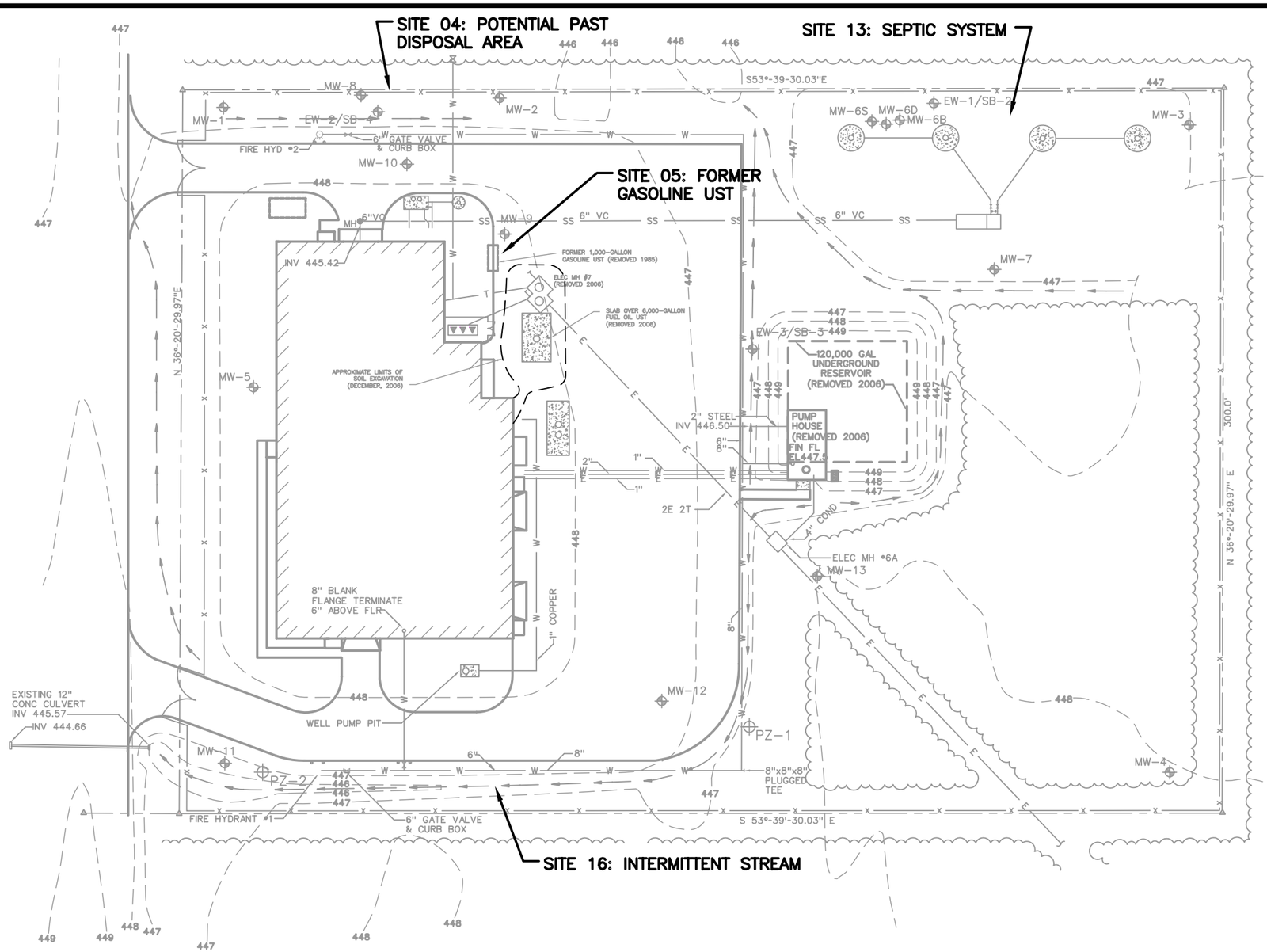


94th Regional Readiness Command
AMSA 68(G), USAR
Lincoln, Rhode Island

KEMRON ENVIRONMENTAL SERVICES MACTEC

Locus Map FIGURE 1-1

GFPR Contract #W911S0-04-F0017



LEGEND:

- PROPERTY BOUNDARY
- EDGE OF PAVEMENT
- FENCE
- SANITARY SEWER
- WATER
- UNDERGROUND ELECTRIC (ABANDONED)
- UNDERGROUND TELEPHONE (ABANDONED)
- VEGETATION
- GROUND SURFACE CONTOUR
- FLOW LINE

DRAWING REFERENCE: PLAN PREPARED BY THE GANTEAUME & McMULLEN, ENTITLED "INDEX TO DRAWINGS & SITE PLAN" (RECORD DRAWING) DATED FEBRUARY 1953 AND REVISED 4/23/57, ORIGINAL SCALE: 1"=20'; FIGURE PREPARED BY NOBIS, ENTITLED "FIGURE 2, SITE PLAN, LINCOLN AMSA 68, ALBION ROAD, LINCOLN, RHODE ISLAND" FROM FINAL REMEDIAL INVESTIGATION REPORT DATED FEBRUARY 27, 2004; AND FIGURE PREPARED BY ENSR, ENTITLED "FIGURE 3-1, SAMPLING LOCATIONS" FROM SITE INVESTIGATION REPORT DATED MAY 1993.

NOTES:
1. ALL LOCATIONS ARE APPROXIMATE.
2. ELEVATIONS REFERENCED TO MEAN SEA LEVEL.
3. MONITORING WELLS MW-1 THROUGH MW-5 WERE INSTALLED BY BRIGGS IN 1986. WELLS EW-1 THROUGH EW-3 WERE INSTALLED BY ENSR IN 1992. WELLS MW-6 THROUGH MW-13 WERE INSTALLED BY NOBIS IN 2002.
4. UNDERGROUND ELECTRIC AND TELEPHONE UTILITIES WERE ABANDONED IN THE 1980s. ELECTRICITY IS CURRENTLY SUPPLIED TO THE FACILITY VIA AN OVERHEAD LINE.

0 25 50 100
SCALE IN FEET

Prepared/Date: MRS / 04-02-07
Checked/Date: RP / 04-02-07

94TH REGIONAL READINESS COMMAND
AMSA 68(G), USAR
LINCOLN, RHODE ISLAND

KEMRON ENVIRONMENTAL SERVICES
MACTEC

SITE LAYOUT

GFPR CONTRACT # W911S0-04-F0017
FIGURE 1-2

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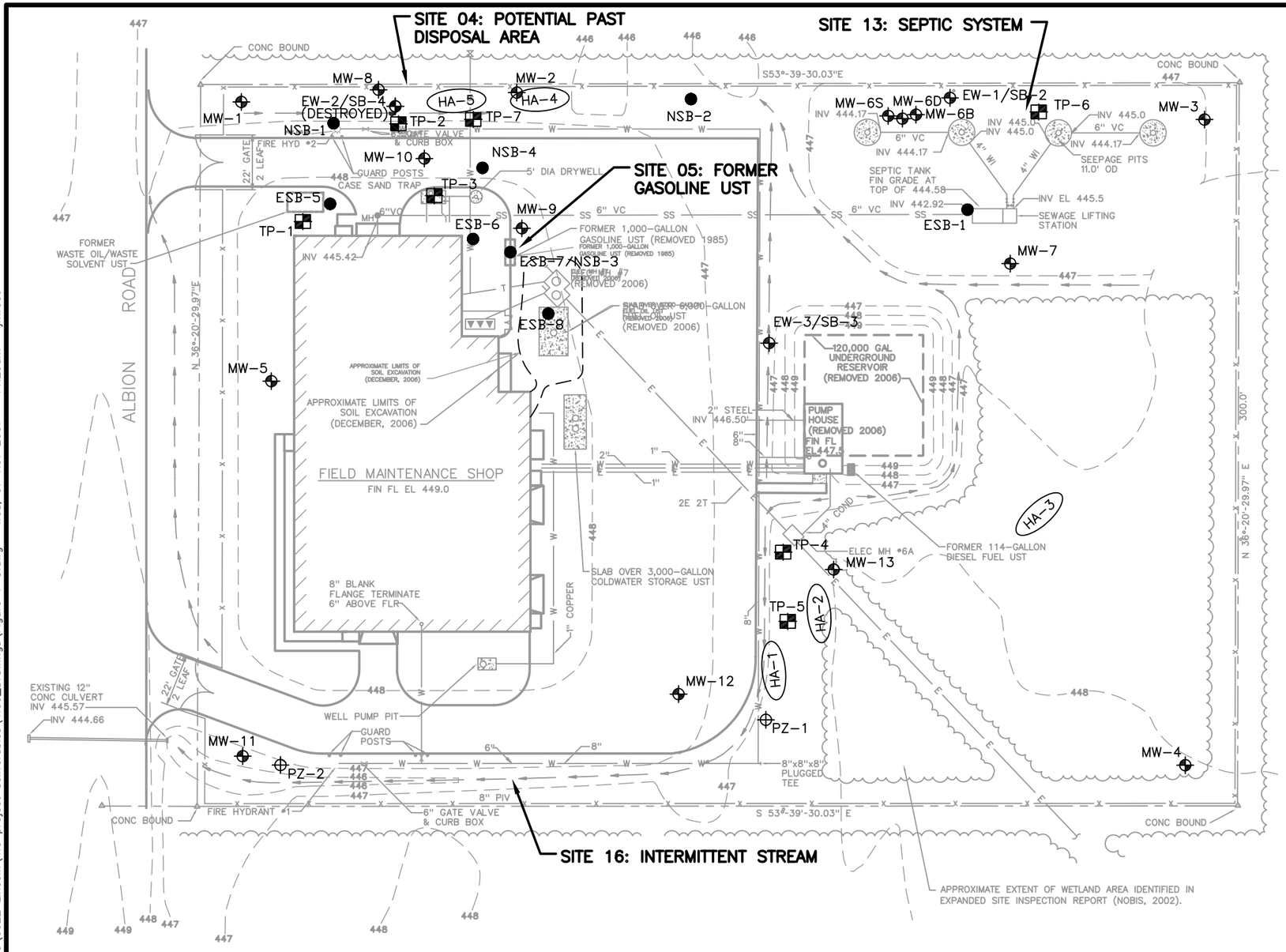

LEGEND:

- MW-1 — PREVIOUS MONITORING WELL
- PZ-1 — PREVIOUS PIEZOMETER
- ESB-1 — PREVIOUS ENSR EXPLORATION LOCATION (1993)
- NSB-1 — PREVIOUS NOBIS EXPLORATION LOCATION (2003)
- HA-4 — HAND AUGER SAMPLE AREA (ENSR 1993)
- PROPERTY BOUNDARY
- EDGE OF PAVEMENT
- FENCE
- SANITARY SEWER
- WATER
- UNDERGROUND ELECTRIC (ABANDONED)
- UNDERGROUND TELEPHONE (ABANDONED)
- VEGETATION
- GROUND SURFACE CONTOUR
- FLOW LINE

NOTES:
1. ALL LOCATIONS ARE APPROXIMATE.
2. ELEVATIONS REFERENCED TO MEAN SEA LEVEL.
3. MONITORING WELLS MW-1 THROUGH MW-5 WERE INSTALLED BY BRIGGS IN 1986. WELLS EW-1 THROUGH EW-3 WERE INSTALLED BY ENSR IN 1992. WELLS MW-6 THROUGH MW-13 WERE INSTALLED BY NOBIS IN 2002.
4. UNDERGROUND ELECTRIC AND TELEPHONE UTILITIES WERE ABANDONED IN THE 1980s. ELECTRICITY IS CURRENTLY SUPPLIED TO THE FACILITY VIA AN OVERHEAD LINE.

0 25 50 100
SCALE IN FEET

DRAWING REFERENCE: PLAN PREPARED BY THE GANTEAUME & McMULLEN, ENTITLED "INDEX TO DRAWINGS & SITE PLAN" (RECORD DRAWING) DATED FEBRUARY 1953 AND REVISED 4/23/57, ORIGINAL SCALE: 1"=20'; FIGURE PREPARED BY NOBIS, ENTITLED "FIGURE 2, SITE PLAN, LINCOLN AMSA 68, ALBION ROAD, LINCOLN, RHODE ISLAND" FROM FINAL REMEDIAL INVESTIGATION REPORT DATED FEBRUARY 27, 2004; AND FIGURE PREPARED BY ENSR, ENTITLED "FIGURE 3-1, SAMPLING LOCATIONS" FROM SITE INVESTIGATION REPORT DATED MAY 1993.

Prepared/Date: MRS / 04-02-07
Checked/Date: RP / 04-02-07

94TH REGIONAL READINESS COMMAND
AMSA 68(G), USAR
LINCOLN, RHODE ISLAND

KEMRON ENVIRONMENTAL SERVICES
MACTEC

PREVIOUS EXPLORATION LOCATIONS
GFPR CONTRACT # W911S0-04-F0017
FIGURE 1-3

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Table 1-1
Summary of Petroleum UST Information for the AMSA 68 (G) Property
Site 04 - Potential Past Disposal Area

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

UST	UST Volume (gallons)	UST Location	Installation Date	Removal Date
Waste Oil/Waste Solvent*	1,000	Northern corner of maintenance building	Late 1950s	1991
Diesel Fuel	114	Southeast of the pump house	1955	1992
Gasoline	1,000	Southeast of the maintenance building	Late 1950s	Apr-85
No. 2 Fuel Oil*	6,000	Southeast of the maintenance building	1983 (1)	Dec-2006

Notes:

* = Each of these USTs failed a leak test in 1990. The fuel oil UST was partially excavated and it passed a subsequent test. According to the Army, the active heating oil (No. 2 Fuel Oil) UST is tightness-tested on an annual basis and there have been no failing tests since 1990.

(1) Some records indicate that this tank was installed as early as 1958.

SOURCE: Nobis, 2004.

Table 1-2
Public Groundwater Drinking Water Supply Sources
Within 4-Radial Miles of AMSA 68 (G)

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

Distance (miles)/Direction from Site	Source Name	Location of Source[A]	Estimated Population Served	Source Type[B]
1.0 miles/northwest	Just For Kids, Inc. Well No. 1	Smithfield	111	Unknown
2.2 miles/east	Crest Manufacturing Co.	Lincoln	40	Unknown
2.5 miles/north	Woodland Convalescent Center	North Smithfield	54	Unknown
2.9 miles/northwest	N. Smithfield Elementary School	North Smithfield	584	Unknown
3.4 miles/north	Manville Well No. 10	Lincoln	Inactive	Overburden
3.4 miles/north	Manville Well No. 3	Lincoln	Inactive	Overburden
3.4 miles/north	Manville Well No. 5	Lincoln	Inactive	Overburden
3.4 miles/north	Manville Well No. 1	Cumberland	2,750	Overburden
3.4 miles/north	Manville Well No. 2	Cumberland	2,750	Overburden
3.6 miles/west	Herbert Nursing Home (two wells)	Smithfield	227	Unknown
3.8 miles/west	N. Smithfield Jr./Sr. High School	North Smithfield	875	Unknown

NOTES:

A - indicates Town in which well is located

B - Overburden, Bedrock, or Unknown

SOURCE: Nobis, 2002.

Prepared by: RP 11/08/06
Checked by: MS 11/09/06

Section 2.0 Remedial Investigation

MACTEC conducted field investigations at Site 04 - PDA during two separate mobilizations: January 2006 and May-June 2007. The methodologies employed for the field tasks are as indicated in the Sampling and Analysis Plan (SAP) (KEMRON/MACTEC, 2005a) and the Site 04 - Potential Past Disposal Area Sampling and Analysis Plan Addendum (KEMRON/MACTEC, 2007a) unless otherwise noted.

Subsection 2.1 presents a summary of the field activities conducted at Site 04 - PDA in January 2006 and May-June 2007. Subsection 2.2 presents the findings of the 2006 and 2007 Site 04 investigations and the Site 05 - Former Gasoline UST groundwater investigations are presented in Subsection 2.3.

2.1 Summary of 2006-2007 RI Field Activities

2.1.1 Mobilization/Demobilization

MACTEC mobilized to the site on January 17, 2006 for the on-site investigation, and began direct-push sampling efforts that morning. Direct-push services were provided by Geologic/Earth Exploration (Geologic) of Norfolk, Massachusetts, under the direction of MACTEC. Field work was substantially completed on January 31, 2006.

With the assistance of the U.S. Army Corps of Engineers, MACTEC coordinated with Rhode Island Airport Corporation (RIAC) and Pure Platinum for access to off-site properties to the north and northeast respectively, and the second mobilization to the site began on May 7, 2007 for the off-site and supplemental on-site investigation. Direct-push subcontractor Gfeologic of Norfolk, Massachusetts, also mobilized to the site on May 7, 2007. Drilling equipment was demobilized from the site on June 8, 2007. MACTEC completed monitoring well development and groundwater sampling on June 27, 2007.

2.1.2 Site Clearance and Utility Mark-Out

Prior to any intrusive subsurface investigations, all locations were cleared of underground utilities. The MACTEC Field Operations Leader located all drilling locations. Once drilling locations were staked, the commercial utility clearing service “Dig-Safe” was contacted to notify local utility companies that they were required to mark their subsurface utilities. Subsurface utilities present in the utility corridor adjacent to the northern boundary of the AMSA 68 (G) reportedly include a 20-inch water main, electrical, and cable lines. The exact locations and depths of the utility lines is unknown; KEMRON has made an inquiry to the utility corridor owner (Rhode Island Airport Corporation), and will add detail to this report as it is made available. Upon mobilization to the site May 7, 2007, it was apparent that neither subsurface electrical nor cable had been marked in the utility corridor to the north of the facility. Utility companies were contacted and completed utility mark-out by May 8, 2007. Exploration locations were adjusted as required to avoid subsurface utilities.

2.1.3 Direct-Push Soil and Groundwater Sampling

Direct-push soil and groundwater samples were collected using a GeoProbe™ as specified in the SAP (KEMRON/MACTEC, 2005a). A summary of RI direct-push explorations is presented as **Table 2-1**. **Table 2-2** presents a summary of RI explorations and analyses, as well as the sample collection method. A discussion of sample analyses and data validation is presented in Section 2.1.6 of this report. Soil boring logs are presented in **Appendix C**. The boring logs contain soil descriptions, field sample identification, depth to groundwater, and photoionization detector (PID) results.

January 2006

MACTEC collected 10 surface soil samples (SS-01 through SS-10) between ground surface and the water table to delineate the surficial contamination and to supplement the 1993 ENSR and 2003 Nobis data in the PDA. **Figure 2-1** presents the locations of these explorations. The majority of explorations were advanced to a total depth of four feet; however, three of the explorations were advanced further (SS-06, SS-07, and SS-09) to evaluate the potential for deeper contamination (**Table 2-1**).

Upon retrieval of each soil core from each borehole, the core was screened with a PID to determine whether any intervals exhibited organic vapors detectable by the PID (see **Appendix C** for PID results). Selection of samples for analysis was biased toward depth intervals with elevated PID readings. Soil samples were submitted for analyses, including VOCs, semivolatile organic compounds (SVOCs), extractable petroleum hydrocarbons (EPH), volatile petroleum hydrocarbons (VPH) and metals (**Table 2-2**).

Ten direct-push groundwater sampling locations were advanced at explorations SS-01 through SS-10 (**Figure 2-2)**. The total of ten groundwater samples collected at these explorations is an increase over the number indicated in the SAP (KEMRON/MACTEC, 2005a), which had indicated that five groundwater samples would be collected. Samples were collected from the water table and submitted for VOC analyses to evaluate potential groundwater impacts (**Table 2-2**).

May-June 2007

MACTEC collected 10 surface soil samples (SS-11 through SS-20) between ground surface and the water table to delineate the surficial contamination on-site and off-site and to supplement the January 2006 investigation. **Figure 2-1** presents the locations of these explorations. All explorations were advanced to a total depth of four feet.

Upon retrieval of each soil core from each borehole, the core was screened with a PID to determine whether any intervals exhibited organic vapors detectable by the PID (see **Appendix C** for PID results). Selection of samples for analysis was biased toward depth intervals with elevated PID readings. Soil samples were submitted for analyses, including VOCs, TPH - diesel range organics (DRO), and TPH – gasoline range organics (GRO) (**Table 2-2**).

Seven direct-push groundwater sampling locations were advanced at explorations GP-01 through GP-07 (**Figure 2-2**). Groundwater samples, from the seven explorations, were generally collected from the water table to evaluate potential groundwater impacts. Samples were submitted for VOC analyses, total lead, and dissolved lead. Two samples, from explorations GP-01 and GP-02, were collected at 14-16 ft bgs, and submitted for VOC analyses.

2.1.4 Monitoring Well Installation

Eleven new monitoring wells, MW-14, MW-14D, MW-15, MW-15D, MW-20, MW-20D, MW-21, MW-21D, MW-22, and MW-22D were installed at Site 04 as part of the RI field investigation. **Figure 2-3** presents the locations of the newly installed monitoring wells. Monitoring well MW-24D depicted on **Figure 2-3**, was installed as part of the Site 05 - Former Gasoline UST Site Investigation. Newly installed monitoring wells were generally installed in separate boreholes than the direct-push groundwater sampling locations. MW-15D, MW-21D, and MW-22D were installed using a drill rig (hollow stem auger [HSA] method) to ensure that the bottom of the borehole would extend to bedrock and not cobbles that can prevent the GeoProbe™ from drilling to bedrock. The screened interval of the new shallow monitoring wells was placed to straddle the water table, and the screened interval of the new deep

monitoring wells was placed at refusal. Procedures outlined in Section 3.7.2 of the SAP (KEMRON/MACTEC, 2005a) were followed for installation of the new monitoring wells. **Table 2-3** presents the details of the monitoring well construction. Monitoring well construction diagrams are presented in **Appendix D**.

Monitoring wells were developed in accordance with Section 3.7.3 of the SAP (KEMRON/MACTEC, 2005a). Monitoring well development forms are presented in **Appendix E**.

2.1.5 Monitoring Well Sampling

The first round of monitoring well sampling was conducted at the site from January 26 through January 31, 2006. The following wells were sampled:

- MW-1, MW-2, MW-8, MW-14, and MW-15

The second round of sampling was conducted at the site from June 25 through June 27, 2007. The following wells were sampled:

- MW-1, MW-2, MW-8, MW-14, MW-14D, MW-15, MW-15D, MW-20, MW-20D, MW-21, MW-21D, MW-22, MW-22D, and MW-24D

Monitoring wells were sampled using low-flow techniques in accordance with Section 3.7.4 of the SAP (KEMRON/MACTEC, 2005a). Field data records for low-flow groundwater sampling can be found in **Appendix F**. Groundwater samples were shipped to the analytical laboratories (see Section 2.1.6) for analysis of VOCs and lead (total and dissolved) in January 2006, and for VOCs only in June 2007 (see **Table 2-2**).

2.1.6 Sample Analyses and Data Validation

Soil samples were analyzed for one or more of the following parameters:

- VOCs by Method 8260B
- SVOCs by Method 8270C
- VPH using Massachusetts Department of Environmental Protection (MADEP) methods
- EPH using MADEP methods
- Selected metals by Methods 6010B, 6020, and 7471A
- GRO by Method 8015M (Site 04 - PDA samples only)
- DRO by Method 8015M (Site 04 - PDA samples only)
- Total Organic Carbon by Method 9060

Aqueous samples were analyzed for one or more of the following parameters:

- VOCs by Method 8260B
- GRO by Method 8015M (Site 05 - Former Gasoline UST samples only)
- DRO by Method 8015M (Site 05 - Former Gasoline UST samples only)
- Total and dissolved lead by Method 6020

All analytes from the January 2006 investigation, except EPH and VPH, were performed by Kemron Environmental Services of Marietta, Ohio. Analyses for EPH and VPH were performed by Accutest

Laboratories of Marlborough, Massachusetts. All analytes from the May and June 2007 investigation were performed by ESS Laboratory, Cranston, Rhode Island.

January 2006 Samples

A Tier II validation was completed for all 2006 samples. For twenty percent of samples a Tier III data validation was performed for VOC, SVOC, and metals analyses. A chemist review was performed on the EPH and VPH analyses. The data package was validated using Region I EPA-New England Data Validation Functional Guidelines for Evaluating Environmental Analyses (USEPA, 1996), Region I Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses (USEPA, 1988), Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (USEPA, 1989) and the Kemron USARC Massachusetts Quality Assurance Project Plan (KEMRON, 2005). Data validation procedures and findings are presented as **Appendix G-1**. Note that **Appendix G-1** provides data validation information for all of the AMSA 68 (G) sites sampled in January 2006, including Site 04 - PDA, and Site 13 - Septic System.

Testing for petroleum hydrocarbons in the January 2006 investigation, covering the gasoline range and diesel range, was completed using MADEP methods for VPH and EPH (MADEP, 2004b). These methods were originally specified in the RI sites program QAPP covering the Lincoln sites because they provide both total hydrocarbon data, as well as a detailed breakdown of hydrocarbon classes and target compounds that could be used in risk assessments. RIDEM provided comments on the Lincoln SAP (KEMRON/MACTEC, 2005) and requested GRO (TPH-8015) as well as DRO (TPH-8100) be included in the analysis. In response to these comments, GRO (TPH-8015) and DRO (TPH-8100) analyses were added to the sample analysis. Due to a miscommunication with the subcontract laboratory, samples were analyzed using the VPH and EPH methods. The VPH and EPH data are presented in this report. The VPH and EPH methods provide data equivalent to what would be obtained from methods 8015 and 8100 for use in evaluation of GRO and DRO hydrocarbons, and are interpreted to be usable for the evaluation of TPH. Analysis for methods 8015, 8100, VPH, and EPH all are completed using the same instrumentation, gas chromatography/flame ionization detector (GC/FID). Method 8100 is a method designed for the analysis of polynuclear aromatic hydrocarbons (PAHs) that has very similar to procedures used to report PAHs in the EPH method, and reporting of DRO is not described in this method. Laboratories often report DRO referencing a modified Method 8100. Method 8015 describes options for GRO and DRO analysis. GRO and DRO is reported using total area response compared to fuel standards for hydrocarbon ranges C6-C10 (GRO) and C10-C28 (DRO). In the VPH and EPH procedures, total hydrocarbons are reported for aliphatic and aromatic hydrocarbons in carbon ranges from C5-C10 (VPH) and C9-C36 (EPH) based on component standards. The VPH and EPH methods also include an option for the reporting of primary target compounds found in fuels. The methods describe an unadjusted and adjusted value for VPH C5-C8 Aliphatics, C9-C12 Aliphatics, and C9-C10 Aromatics, and EPH C11-C22 Aromatics. Adjusted values have target compound concentrations removed from range concentrations. Unadjusted concentrations include the total area within the range without subtraction of target compounds.

Using the available VPH and EPH results, a concentration for TPH (calculated) was determined by summing the detected results of VPH C5-C8 Aliphatics (unadj.), C9-C10 Aromatics (unadj.), and C9-C12 Aliphatics (unadj.), and EPH C11-C22 Aromatics (unadj.), C19-C36 Aliphatics, and C9-C18 Aliphatics. These calculated TPH data are presented in Section 2.2 of this report.

May-June 2007 Samples

A USEPA Tier II validation was completed for all analytical samples collected in 2007, with the exception of GRO and DRO analyses performed on two groundwater samples collected from Site 05. For

ten percent of the 2007 samples, a Tier III data validation was performed for VOC, DRO, GRO, and metals analyses. The data package was validated using Region I EPA-New England Data Validation Functional Guidelines for Evaluating Environmental Analyses (USEPA, 1996), Region I Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses (USEPA, 1988), Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (USEPA, 1989), and the KEMRON USARC Rhode Island Quality Assurance Project Plan (KEMRON/MACTEC, 2005b). Data validation procedures and findings are presented as **Appendix G-2**. Note that **Appendix G-2** provides data validation information for all of the AMSA 68 (G) sites sampled in May and June 2007, including Site 04 - PDA.

2.1.7 Survey

All direct-push soil and groundwater sample locations during the January 2006 investigation were referenced to existing structures (i.e., buildings, septic system seepage pits, etc.) on the site layout drawing (**Figure 2-1 and Figure 2-2**) using cardinal directions (compass) and distances. All direct-push soil and groundwater sample locations during the May and June 2007 investigation and all new monitoring wells (and existing monitoring wells) were located by ASEC Corporation (ASEC), Boston, Massachusetts, a Rhode Island Professional Licensed Surveyor, on May 16, 2007 and June 19, 2007. ASEC Corporation is a registered professional surveying company in the State of Rhode Island. Survey data for the explorations is presented as **Appendix H**.

2.1.8 Groundwater Measurements

Depth to groundwater measurements were conducted on January 31, 2006 and May 23, 2006 during the 2006 investigation, and depth to groundwater measurements were conducted on May 23, 2007 and June 25, 2007 during the 2007 investigation. Depth to groundwater measurements are presented and discussed in Section 2.2.2 of this report.

2.1.9 Investigation-Derived Waste

Solid and liquid investigation-derived waste (IDW) generated during the RI field investigation were handled in accordance with Section 5.0 of the SAP (KEMRON/MACTEC, 2005a). IDW generated during the RI field investigation included soil cuttings from soil boring advancement, water from well development, well purging and sampling, equipment decontamination, and used personal protective equipment (PPE). During the investigation, soil cuttings with PID screening results less than 10 parts per million (ppm) were returned to the boring holes from which the soil cutting were obtained, and liquid IDW from monitoring well purging with PID screening results of 0 ppm and no petroleum odor were spread uniformly over grass areas on-site. The remaining IDW was containerized and placed in clean Department of Transportation-approved 55-gallon steel drums (appropriately labeled for soil IDW and for liquid IDW) and stored on-site at Site 04-PDA.

The containerized IDW was stored on wood pallets, labeled in accordance with Section 5.0 of the SAP (KEMRON/MACTEC, 2005a). The IDW drums from the January 2006 investigations were removed on May 23, 2006 by New England Disposal Technologies. The IDW drums from the May-June 2007 investigations were removed on October 18, 2007 by Fleet Environmental Services and shipped to a licensed disposal facility. The waste manifests were signed by a representative from the U.S. Army Corps of Engineers, New England District.

2.2 Summary of Results

The following subsections present the site geology, hydrogeology, and the analytical results for Site 04 - PDA.

2.2.1 Site Geology

The United States Geological Survey (USGS) map of the Surficial Geology of the Pawtucket Quardrangle maps the area in the vicinity of the AMSA 68 (G) facility as ground moraine (glacial till), consisting of an unstratified mixture of clay, silt, sand, gravel, and boulders (ENSR, 1993). A reference on this map to several excavations along Harris Avenue (approximately 1 mile southeast of the facility) indicates the surficial material to be a compact brownish till. Logs of geotechnical borings performed on the AMSA 68 (G) property prior to construction activities in 1958, indicate a brown to gray compact gravely silty sand (till) underlying topsoil. In 1986, a drilling program was carried out by Briggs Associates, which installed five soil borings and five monitoring wells around the perimeter of the facility property (boring logs are included in **Appendix C**. Logs of these borings indicate the subsurface materials underlying topsoil to generally consist of brown to gray, medium dense to very dense, fine to coarse sand with little to some silt and trace amounts of gravel and cobbles. In the area between Site 05 and Site 04, there is some indication from the boring logs that the formation becomes somewhat coarser with depth (i.e., increasing amounts of fine to coarse gravel and cobbles, with gradation). A thin (typically less than 1-foot thick) layer of weathered granite was encountered in several of the Briggs borings at depths ranging from 18 to 20 feet below the ground surface (bgs). Refusal of drilling tools at approximately 20 feet bgs appears to be rather abrupt, as indicated by blow counts greater than 100 over six inches in the first split spoon attempted at the top of bedrock (see logs in **Appendix C**). A seismic refraction survey performed in November 2002 indicated the depth to competent bedrock varies between 15 and 20 feet bgs. Based on the USGS map of the Bedrock Geology of Rhode Island (USGS, 1971), the bedrock underlying the facility corresponds with the Esmond Granite. The USGS describes the Esmond Granite as massive (i.e., displaying an absence of foliation, cleavage, or joints), medium to coarse grained granite, which is consistent with the observation of the thin layer of weathered granite and abrupt refusal of drilling tools at the bedrock surface.

2.2.2 Site Hydrogeology

The following are ranges of depths to groundwater beneath the AMSA 68 (G) facility for the dates indicated:

January 31, 2006	1.5 to 2.5 feet bgs
May 23, 2006	1 to 2 feet bgs
May 23, 2007	1 to 5 feet bgs
June 25, 2007	2 to 8 feet bgs

Based on the historical and 2007 rounds of water level measurements, it appears that the site is generally characterized by a very shallow water table, subject to fluctuations on the order of several feet.

Groundwater elevations were calculated for the May 23, 2007 and June 25, 2007 measurements, and are presented in **Table 2-4**. The overburden aquifer has been divided into shallow (water table to approximately 12 feet bgs) and deep (approximately 12 feet to 20 feet bgs) units for evaluation of vertical hydraulic gradients and contaminant distribution. Interpretive shallow groundwater elevation contours using the May 23, 2007 groundwater elevations are presented as **Figure 2-4**. June 25, 2007 interpretive shallow and deep groundwater elevation contours are presented as **Figures 2-5** and **2-6**, respectively.

Shallow overburden groundwater flow direction on the western side of the property on both dates is toward the north and northwest in the vicinity of Sites 04 and 05; however, the flow direction on the eastern portion of the property, in the vicinity of the Septic System (Site 13), is toward the east and southeast. A groundwater divide is present as a line trending northeast to southwest in the vicinity of monitoring well EW-3 (**Figures 2-4** and **2-5**). The location of the groundwater divide shifts depending on the water table elevation (i.e., seasonal effects), and impacts groundwater flow directions between Site 05 and Site 13. Due to the flat topography, surface water runoff is toward drainage ditches.

In the areas of Sites 04-PDA and 05-Former Gasoline UST, shallow overburden groundwater flow is to the north, from the Former Gasoline UST toward the PDA. An anomalously high water level in monitoring well MW-15 on May 23, 2007 (see **Figure 2-4**) may possibly be the result of a potential leaking water supply pipe running from the utility corridor north of the property into the AMSA 68(G) facility. The anomalously high water level may also be a transient effect due to infiltration of spring rains. This anomaly was also evident in the May 23, 2006 groundwater elevation data presented in the Draft Final Site Investigation Report (SIR) submitted to RIDEM on May 1, 2007. However, the anomalous water level at MW-15 is absent on June 25, 2007 (see **Figure 2-5**). The presence of the groundwater mound in the vicinity of MW-15 may cause some groundwater flowing from Site 05 to diverge toward the northeast. Overall, water table elevations are approximately 3 feet lower in June 2007 than May 2007.

Deep overburden groundwater interpretive groundwater elevation contours for June 25, 2007 are presented as **Figure 2-6**. Deep overburden groundwater flow direction is similar to that of the shallow overburden (see **Figure 2-5**), flowing to the north, from the Former Gasoline UST toward the PDA. However, the interpretive contours using the June 25, 2007 elevation data indicate a "sink" at MW-10D. This sink may be the result of higher permeability than the surrounding aquifer (potentially coarser material at depth between Site 05 and Site 04) and/or may be a transient effect due to fluctuations in the water table elevation as a result of infiltrating precipitation.

The groundwater elevation data from May 23, 2007 and June 25, 2007 indicate horizontal groundwater gradients ranging from 0.0033 feet/foot to 0.0223 feet/foot (see **Appendix I** for groundwater horizontal gradient calculations). Using an estimated site hydraulic conductivity value of 2.46 feet/day , a gradient of 0.00139 feet/foot, and a porosity of 0.3 from the Nobis 2004 RI Report (Nobis, 2004), an approximate groundwater flow velocity of 41 feet/year was calculated for the vicinity of Sites 04 and 05 (**Appendix I**).

Groundwater vertical hydraulic gradients using the June 25, 2007 groundwater elevation data are presented in **Appendix I**. The vertical hydraulic gradients between well pairs generally vary between 0.039 feet per foot downward to 0.057 feet/foot upward. The exception is the vertical gradient calculated for monitoring well pair MW-10/MW-10D, which is 0.45 feet/foot downward. May 2006 and May 2007 groundwater elevation data indicate shallow groundwater mounding in the vicinity of the MW-10/MW-10D well pair, although this is not evident in the June 25, 2007 data. Several other well pairs (MW-14/MW-14D, MW-15/MW-15D, MW-16/MW-16D, MW-17/MW-17D) in the vicinity of MW-10/MW-10D (located between Site 05 and Site 04) also exhibit downward vertical gradients in the June 25, 2007 data set. The remaining well pairs exhibit slight upward vertical gradients. Calculated vertical hydraulic gradient values are presented on **Figure 2-6**.

Due to the nature of the underlying Esmond granite bedrock (i.e., likely absence of joints, cleavage, fractures, etc.), bedrock beneath the AMSA 68 (G) facility is not considered to be a significant aquifer.

2.2.3 Analytical Results

The following subsections present the summary of results for the RI field investigations at Site 04-PDA. Complete soil and groundwater analytical results for 2006 and 2007 sample analyses can be found in **Appendix J**.

2.2.3.1 Soil Samples

MACTEC collected surface and subsurface soil samples at twenty explorations (SS-01 through SS-20) to delineate the soil contamination and to supplement the 1993 ENSR and 2003 Nobis data in the PDA. **Figure 2-1** presents the locations of 2006 and 2007 explorations. The majority of explorations were advanced to a total depth of four feet; however, three of the explorations were advanced further (SS-06, SS-07, and SS-09) to evaluate the potential for deeper contamination (**Table 2-1**).

Elevated PID readings and/or petroleum odors were observed in samples from SS-01, -03, -04, -05, -07, -08, -09, -12, -13, and -14 (see **Appendix C**). The 8-12 foot interval from exploration SS-07 and the 4-8 foot interval from SS-09 both had PID readings greater than 100 ppm and a noticeable petroleum odor.

Table 2-5 presents the analytes detected in soil samples collected at Site 04-PDA. The distributions of selected gasoline-related and chlorinated analytes are presented on **Figures 2-7** through **2-12** The following paragraphs present a summary of detected analytes by chemical class.

VOCs

Numerous fuel-related VOCs were detected in soils, including benzene, ethyl benzene, xylenes, toluene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 4-iso-propyltoluene, fluorobenzene, isopropylbenzene, n-butylbenzene, propylbenzene, sec-butylbenzene, tert-butylbenzene, and naphthalene, (**Table 2-5**). The highest detected concentrations of these fuel-related VOCs were found in the surface soil samples from explorations SS-05, SS-08, SS-09, and SS-10, which are located on the eastern half of the PDA (**Figures 2-7** through **2-10**). The only fuel-related VOCs detected in the surface samples from off-site (north of the fenceline) were from explorations SS-13 and SS-14.

Two soil samples were collected from exploration SS-07, at 1-2 feet and 11-12 feet below the water table. The 11-12 foot sample contained significantly higher concentrations of ethyl benzene and xylenes than the 1-2 foot sample (**Table 2-5**). The only VOC with concentrations exceeding RIDEM GA LC was naphthalene, in explorations SS-01, SS-05, SS-07 (both sample intervals), SS-09, and SS-10. Naphthalene concentrations exceeding the GA LC of 0.8 mg/kg range from 1.91 mg/kg in exploration SS-07 to 9.91 mg/kg in exploration SS-10 (**Figure 2-10**). Naphthalene was detected at off-site locations, SS-13 (0.623 mg/kg) and SS-14 (0.799 mg/kg). VOC concentrations exceeding GA LC have been bounded by explorations around the perimeter of the site, as indicated in **Figures 2-7** through **2-10**. No fuel-related VOC concentrations exceed the RIDEM I/C DEC.

Chlorinated solvents detected in soil samples from the PDA include 1,1,1-trichloroethane (1,1,1-TCA), cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), and trichloroethene (TCE) (**Table 2-5**). These solvents were detected in samples from explorations SS-02, SS-05, SS-07, and SS-08 (see **Figures 2-11** and **2-12**). The highest concentrations of chlorinated solvents were detected in the 1-2 foot sample from SS-08, in which cis-1,2-DCE was detected at a concentration of 0.284 mg/kg. Detected chlorinated solvent concentrations do not exceed the RIDEM GA LC or I/C DEC. Chlorinated solvents were not detected in the off-site surface soil samples.

Hydrocarbons (MADEP Methods)

Hydrocarbons detected in PDA soils include 2-methylnaphthalene, acenaphthene, benzo(ghi)perylene, ethyl benzene, fluoranthene, fluorene, naphthalene, phenanthrene, pyrene, toluene, and xylenes (**Table 2-5**). The highest detected concentrations of these hydrocarbons were found in the surface samples from explorations SS-05, SS-09, and SS-10, which are located on the eastern half of the PDA (**Figure 2-1**); this is consistent with the fuel-related VOC findings discussed above. Naphthalene concentrations exceed the GA LC of 0.8 mg/kg in samples from explorations SS-01, SS-03, SS-05, SS-07, SS-08, SS-09, and SS-10 (**Table 2-5** and **Figure 2-10**). Naphthalene concentrations detected using the MADEP method are generally consistent with those detected using the VOC Method 8260B (see **Table 2-5**). No hydrocarbon concentrations exceeded the RIDEM I/C DEC.

TPH (calculated) concentrations ranged from 67.5 mg/kg in the 2-3 foot sample from SS-06, to 11,576 mg/kg in the 1-2 foot sample from SS-09 (**Table 2-5**). TPH (calculated) concentrations exceed the GA LC of 500 mg/kg in samples from explorations SS-01, SS-03, SS-05, SS-07, SS-08, SS-09, and SS-10. Concentrations of TPH (calculated) also exceed the I/C DEC of 2,500 mg/kg in SS-01, SS-03, SS-05, SS-07, SS-09, and SS-10. However, TPH (calculated) concentrations exceeding GA LC and I/C DEC have been bounded by explorations around the perimeter of the site.

Hydrocarbons (TPH-GRO and TPH-DRO)

Detected TPH-DRO concentrations ranged from 68.5 mg/kg at SS-12 to 2750 mg/kg at SS-14. Detected TPH-GRO concentrations ranged from 1.92 mg/kg at SS-20 to 50.8 mg/kg at SS-13. TPH (calculated) concentrations (based on adding TPH-DRO and TPH-GRO) ranged from 1.92 mg/kg at SS-20 to 2876 mg/kg at SS-14. TPH concentrations exceed the GA LC of 500 mg/kg in samples from explorations SS-13, SS-14, and SS-15 (**Table 2-5**). Concentrations of TPH also exceed the I/C DEC of 2,500 mg/kg in SS-14. However, TPH (calculated) concentrations exceeding GA LC and I/C DEC have been bounded by explorations around the perimeter of the site.

Lead

Lead was detected in all 12 soil samples (10 explorations) from the PDA during the 2006 investigation. Concentrations of lead range from 7.49 mg/kg in the 11-12 foot sample from SS-07, to 124 mg/kg in the 0-1 foot sample from SS-03 (**Table 2-5**). Concentrations of lead in soils at the PDA do not exceed the RIDEM GA LC or I/C DEC. Surface soil samples collected during the 2007 investigation were not analyzed for lead.

2.2.3.2 Groundwater Samples

Ten direct-push groundwater sampling locations were advanced on-site at explorations SS-01 through SS-10, and seven direct-push groundwater sampling locations were advanced off-site at explorations GP-01 through GP-07 (**Figure 2-1**). **Table 2-1** presents the groundwater sampling interval in each of these explorations. The following monitoring wells were also sampled: MW-1, MW-2, MW-8, MW-14, MW-14D, MW-15, MW-15D, MW-20, MW-20D, MW-21, MW-21D, MW-22, MW-22D, and MW-24D. Both direct-push and monitoring well groundwater samples were analyzed for VOCs and lead (total and dissolved) during the 2006 investigation (**Table 2-2**). During the 2007 investigation, direct-push groundwater samples were analyzed for VOCs and lead (total and dissolved), and groundwater samples were analyzed for VOCs only.

Review of the Site 04 groundwater data reveals that chlorinated solvents and gasoline/fuel-related constituents are present in shallow groundwater beneath the PDA (see **Table 2-6**, explorations SS-01 through SS-10); however, the chlorinated solvents are not detected in the deeper overburden groundwater.

Slightly upward vertical hydraulic gradients in the vicinity of the PDA support the lack of chlorinated solvents at depth beneath the PDA. In addition, the continuous nature of the gasoline-related groundwater plume from Site 05 to the deep overburden and downgradient to the north beneath the PDA support the interpretation that the deep overburden groundwater beneath and immediately downgradient of the PDA is not impacted by PDA contaminants, and should be considered part of the Site 05 groundwater flow regime. Therefore, any groundwater samples with bottom depths greater than 12 feet bgs are considered part of the Site 05 groundwater flow regime, and are discussed in the Site 05 - Former Gasoline UST Site Investigation Report (KEMRON/MACTEC, 2007b).

Table 2-6 presents the analytes detected in direct-push and monitoring well groundwater samples collected at Site 04-PDA. The distribution of these detected analytes is presented on **Figures 2-13** through **2-20**. The following paragraphs present a summary of detected analytes by chemical class.

VOCs

Numerous fuel-related VOCs were detected in shallow (0-12 feet bgs) groundwater, including 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethyl benzene, naphthalene, xylenes, and toluene (**Table 2-6**), which are the same group of analytes detected in PDA soils. The highest detected concentrations of these fuel-related VOCs were found in direct-push exploration SS-08 and monitoring well MW-14. The VOCs benzene and naphthalene were detected in groundwater at concentrations exceeding RIDEM GA GO (**Table 2-6**). Benzene concentrations exceeded the GA GO of 0.005 mg/L in direct-push explorations SS-01 (0.00541 mg/L) and SS-08 (0.00821 mg/L), and the following monitoring wells:

- MW-14 (0.02 mg/L - 2006 investigation, and 0.202 mg/L - 2007 investigation)
- MW-21 (0.0256 mg/L)

Naphthalene concentrations in groundwater exceeded the GA GO of 0.02 mg/L in direct-push explorations SS-01 (0.031 mg/L), SS-07 (0.0225 mg/L), SS-08 (0.159 mg/L), SS-09 (0.0607 mg/L), and SS-10 (0.104 mg/L).

Chlorinated solvents detected in groundwater samples from the PDA included 1,1-dichloroethane, 1,2-dichlorobenzene, 1,2-dichloroethane, 1,3-dichloropropane, chlorobenzene, chloroethane, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride (**Table 2-6**). These solvents were detected in samples from explorations SS-01, and SS-05 through SS-10, with the highest concentrations detected in SS-08. Detected chlorinated solvent concentrations did not exceed RIDEM GA GO.

Lead

Total (unfiltered sample) lead was detected in all 10 direct-push explorations on-site (SS-01 through SS-10), 4 direct-push explorations off-site (GP-03, GP-04, GP-05, and GP-07), and monitoring wells MW-14 and MW-15 sampled during the 2006 investigation (lead was not sampled for in the monitoring wells during the 2007 investigation), at concentrations ranging from 0.0011 mg/L (GP-03) to 2.26 mg/L (SS-01) (**Table 2-6**).

Filtered sample lead concentrations were markedly lower, and were detected in twelve out of the fifteen groundwater samples in the 2006 investigation. Lead in filtered samples was not detected in samples from any of the seven direct-push explorations (GP-01 through GP-07) in the 2007 investigation. Concentrations of detected dissolved lead in filtered samples ranged from 0.00276 mg/L (MW-2) to 0.116 mg/L (SS-06), and exceed the GA GO of 0.015 mg/L in MW-15, SS-03, SS-05, and SS-06 (see **Figure 2-5**). Concentrations of lead in the filtered groundwater samples are significantly lower than those in the

unfiltered samples, suggesting that the lead detected in the unfiltered samples is largely attributable to suspended solids.

2.2.4 Site 04 - PDA Summary of Findings

Soil: Field observations and analytical data indicate that surface and subsurface soils at the PDA have been impacted by past site activities. Vadose zone soils contain naphthalene concentrations exceeding the GA LC (0.8 mg/kg). TPH concentrations in soil exceed the GA LC of 500 mg/kg and the I/C DEC of 2,500 mg/kg. Chlorinated VOCs were detected in vadose zone soils, but concentrations do not exceed RIDEM I/C DEC or GA LC. Concentrations of all analytes exceeding RIDEM I/C DEC and/or GA LC have been bounded by explorations around the perimeter of the site. Analytes and concentrations in the PDA soils are consistent with findings presented in Table 5.2 of the 2004 Nobis RI Report for AOC/Source 10 (Nobis, 2004). The presence of fuel-related and chlorinated solvent VOCs in near-surface soils above the water table indicate that the area was used at some point in the past to dispose of waste and/or raw fuels and solvents. Detection of these VOCs in soils below the water table are likely sue to transport via groundwater from Site 05 - Former Gasoline UST.

Groundwater: Detected constituents in shallow groundwater beneath the PDA are generally consistent with those found in soils at this site, primarily fuel-related and chlorinated VOCs. Benzene, naphthalene, and lead (filtered and unfiltered samples) concentrations in shallow (0-12 feet bgs) groundwater from direct-push and monitoring well samples exceed the RIDEM GA GO. Unfiltered lead sample concentrations are likely attributable to suspended solids. Concentrations of benzene, ethyl benzene, and xylenes in monitoring well MW-8 are consistent with those reported in Table 5.3 of the 2004 Nobis RI Report (Nobis, 2004); however, concentrations of toluene are significantly lower - 0.26 mg/L in 2004 versus 0.00283 mg/L in 2006. Fuel-related constituents and chlorinated VOCs detected in groundwater are likely attributable to release(s) at the PDA surface.

MAP 45
LOT 87

- Pure Platinum, LLC

MAP 45
LOT 47B

_ Rhode Island
Airport Corporation

Site 04 - Potential Past Disposal Area

SS-17
SS-18
SS-19
SS-20
SS-12
SS-13
SS-14
SS-11
SS-01
SS-03
SS-05
SS-07
SS-09
SS-15
SS-04
SS-08
SS-02
SS-06
SS-10
SS-16

Former Oil/Water Separator
and Dry Well (Removed 1995)

Legend

- Soil Exploration
- Facility Boundary
- Fence
- Building
- Pavement Edge
- Subsurface Communication Line (Abandoned)
- Subsurface Electric Line (Abandoned)
- Subsurface Sanitary Line
- Subsurface Water Line
- Septic
- Subsurface Concrete Structure
- UST (Abandoned)
- Estimated Property Boundary

N

0 5 10 Feet

Prepared/Date: BJS 09/10/07
Checked/Date: DRP 09/10/07

94TH Regional Readiness Command
AMSA 68 (G) USAR
Lincoln, Rhode Island

KEMRON ENVIRONMENTAL SERVICES

MACTEC

Project 3618-04-8122

Direct-Push Soil Exploration Locations
Site 04 - PDA
Figure 2-1

GP-07

GP-04

GP-03

GP-05

GP-06

Site 04 - Potential Past Disposal Area

GP-01

GP-02

MAP 45
LOT 87
- Pure Platinum, LLC

MAP 45
LOT 47B
Rhode Island
Airport Corporation

SS-01

SS-02

SS-03

SS-04

SS-05

SS-06

SS-07

SS-08

SS-09

SS-10

Former Oil/Water Separator and Dry Well

Site 05 - Former Gasoline UST

MAP 45
LOT 47
Rhode Island
Airport Corporation

ALBION ROAD

Legend

- Direct-Push Groundwater Explorations
- Facility Boundary
- Fence
- Building
- Pavement Edge
- Subsurface Communication Line (Abandoned)
- Subsurface Electric Line (Abandoned)
- Subsurface Sanitary Line
- Subsurface Water Line
- Septic
- Subsurface Concrete Structure
- UST (Abandoned)
- Estimated Property Boundary

N

0 20 40 Feet

Prepared/Date: BRP 12/05/07
Checked/Date: DRP 12/05/07

94TH Regional Readiness Command
AMSA 68 (G) USAR
Lincoln, Rhode Island

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Direct-Push Groundwater Exploration Locations
Site 04 - PDA
Figure 2-2

Project 3618-04-8122

MAP 45 - Pure Platinum, LLC
LOT 87

MAP 45 _ Rhode Island
LOT 47B Airport Corporation

MAP 45 _ Rhode Island
LOT 47 Airport Corporation

ALBION ROAD

MW-20D
MW-20
MW-21D
MW-21
MW-22
MW-22D
MW-24D
MW-14
MW-14D
MW-8
MW-1
MW-15
MW-15D
MW-2
MW-16
MW-16D
MW-10D
MW-10
MW-17D
MW-17
MW-18
MW-18D
MW-9
MW-19
MW-26D
MW-23
MW-27D
MW-27

Site 04 - Potential Past Disposal Area

Former Oil/Water Separator and Dry Well (Removed 1995)

Site 05 - Former Gasoline UST

Former Electrical Service Manhole (Excavated December 2006)

Former 6,000-gallon Fuel Oil UST (Excavated December 2006)

Former 2,000-gallon Water UST

Former Electrical Transformer

AMSA 68(G) MAINTENANCE BUILDING

Legend

- Monitoring Well Location
- Facility Boundary
- Fence
- Building
- Pavement Edge
- Subsurface Communication Line (Abandoned)
- Subsurface Electric Line (Abandoned)
- Subsurface Sanitary Line
- Subsurface Water Line
- Septic
- Subsurface Concrete Structure
- UST (Abandoned)
- Estimated Property Boundary

N

0 10 20 Feet

94TH Regional Readiness Command
AMSA 68 (G) USAR
Lincoln, Rhode Island

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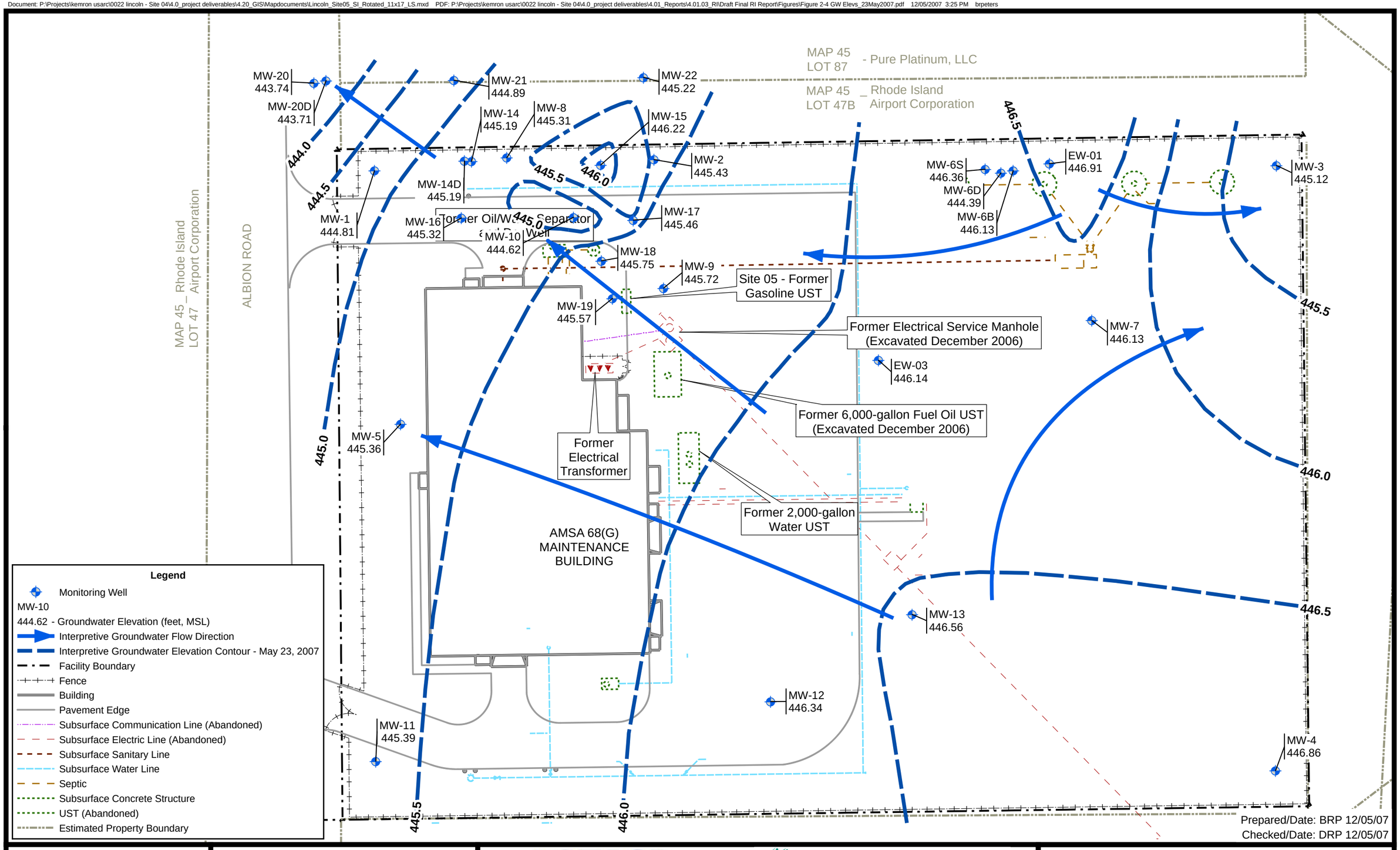
Prepared/Date: BRP 12/05/07
Checked/Date: DRP 12/05/07

Project 3618-04-8123

Monitoring Well Locations
Sites 04 and 05
Figure 2-3



94TH Regional Readiness Command
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Lincoln, Rhode Island

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Interpretive Groundwater Elevation Contours and
Flow Direction - Shallow Overburden - May 23, 2007
Project 3618-04-8123
Figure 2-4

MAP 45 LOT 87 - Pure Platinum, LLC

MAP 45 LOT 47B _ Rhode Island Airport Corporation

MAP 45 _ Rhode Island LOT 47 _ Airport Corporation

ALBION ROAD

MW-20 440.53
MW-21 441.72
MW-1 441.7
MW-8 442.35
MW-15 442.6
MW-22 442.37
MW-2 442.67
MW-14 442.26
MW-16 442.36
MW-10 442.81
MW-17 442.82
MW-18 442.8
MW-9 443.03
MW-19 443.03
MW-23 443.16
MW-6S 442.72
MW-6B 442.61
EW-1 443.15
MW-3 441.75
MW-7 442.88
MW-27 443.075
EW-3 443.1
MW-5 442.58
MW-13 443.87
MW-12 444.4
MW-11 442.04
MW-4 444.41

Site 05 - Former Gasoline UST

Former Electrical Service Manhole (Excavated December 2006)

Former 6,000-gallon Fuel Oil UST (Excavated December 2006)

Former Electrical Transformer

Former 2,000-gallon Water UST

AMSA 68(G) MAINTENANCE BUILDING

441 441.5 442 442.5 443 443.5 444

Legend

- Monitoring Well
- MW-10
- 442.81 - Groundwater Elevation (feet, MSL)
- Interpretive Groundwater Flow Direction
- Interpretive Groundwater Elevation Contour - Shallow Overburden - June 25, 2007
- Facility Boundary
- Fence
- Building
- Pavement Edge
- Subsurface Communication Line (Abandoned)
- Subsurface Electric Line (Abandoned)
- Subsurface Sanitary Line
- Subsurface Water Line
- Septic
- Subsurface Concrete Structure
- UST (Abandoned)
- Estimated Property Boundary

N

0 20 40 Feet

Prepared/Date: BRP 12/05/07
Checked/Date: DRP 12/05/07

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AMSA 68 (G) USAR
Lincoln, Rhode Island

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Interpretive Groundwater Elevation Contours and Flow Direction - Shallow Overburden - June 25, 2007

Project 3618-04-8123

Figure 2-5

MAP 45 LOT 87 - Pure Platinum, LLC

MAP 45 LOT 47B _ Rhode Island Airport Corporation

MAP 45 _ Rhode Island LOT 47 _ Airport Corporation

ALBION ROAD

MW-20D 440.64 0.014

MW-21D 441.865 0.018

MW-22D 442.375 0.001

MW-14D 442.2 -0.008

MW-15D 442.385 -0.038

MW-10D 441.46 -0.45

MW-24D 441.315

MW-16D 442.135 -0.039

MW-17D 442.675 -0.017

MW-18D 443.04 0.057

MW-6D 441.61

MW-26D 442.865

MW-27D 443.095 0.003

441 441.5 442 442.5 443

Former Oil/Water Separator Well

Site 05 - Former Gasoline UST

Former Electrical Service Manhole (Excavated December 2006)

Former 6,000-gallon Fuel Oil UST (Excavated December 2006)

Former Electrical Transformer

Former 2,000-gallon Water UST

AMSA 68(G) MAINTENANCE BUILDING

Notes:

0.014 - Vertical hydraulic gradient calculated for monitoring well pair; a negative value indicates a downward vertical gradient.

Legend

- Monitoring Well
- MW-10D
- 442.135 - Groundwater Elevation (feet, MSL)
- Interpretive Groundwater Flow Direction
- Interpretive Groundwater Elevation Contour - Deep Overburden - June 25, 2007
- Facility Boundary
- Fence
- Building
- Pavement Edge
- Subsurface Communication Line (Abandoned)
- Subsurface Electric Line (Abandoned)
- Subsurface Sanitary Line
- Subsurface Water Line
- Septic
- Subsurface Concrete Structure
- UST (Abandoned)
- Estimated Property Boundary

N

0 20 40 Feet

Prepared/Date: BRP 12/05/07
Checked/Date: DRP 12/05/07

94TH Regional Readiness Command
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Interpretive Groundwater Elevation Contours and Flow Direction - Deep Overburden - June 25, 2007

Project 3618-04-8123

Figure 2-6

MAP 45
LOT 87

- Pure Platinum, LLC

MAP 45
LOT 47B

_ Rhode Island
Airport Corporation

Site 04 - Potential Past Disposal Area

SS-17
SS-18
SS-19
SS-20
SS-12
SS-13
SS-14
SS-11
SS-01
SS-03
SS-05
SS-07
SS-09
SS-15
SS-04
SS-08
SS-02
SS-06
SS-10
SS-16

Former Oil/Water Separator
and Dry Well (Removed 1995)

Legend

Benzene in Soil (0-2 ft bgs)
mg/kg

- 0.000927 - 0.001
- 0.001 - 0.012
- Benzene Analyzed in GW (Not Detected)
- Facility Boundary
- Fence
- Building
- Pavement Edge
- Subsurface Communication Line (Abandoned)
- Subsurface Electric Line (Abandoned)
- Subsurface Sanitary Line
- Subsurface Water Line
- Septic
- Subsurface Concrete Structure
- UST (Abandoned)
- Estimated Property Boundary

Notes:

I/C DEC = 200 mg/kg
GA LC = 0.2 mg/kg

Prepared/Date: BJS 08/30/07
Checked/Date: DRP 08/30/07

N

0 5 10 Feet

94TH Regional Readiness Command
AMSA 68 (G) USAR
Lincoln, Rhode Island

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Project 3618-04-8122

Benzene in Soil
0-2 feet bgs
Figure 2-7

MAP 45
LOT 87

- Pure Platinum, LLC

MAP 45
LOT 47B

_ Rhode Island
Airport Corporation

Site 04 - Potential Past Disposal Area

SS-17
SS-18
SS-19
SS-20
SS-12
SS-13
SS-14
SS-11
SS-01
SS-03
SS-05
SS-07
SS-09
SS-15
SS-04
SS-08
SS-02
SS-06
SS-10
SS-16

Former Oil/Water Separator
and Dry Well (Removed 1995)

Legend

Toluene in Soil (0-2 ft bgs)
mg/kg

- 0.000909 - 0.01
- 0.01 - 0.1
- 0.1 - 1.0
- 1.0 - 3.19
- Toluene Analyzed in GW (Not Detected)
- Facility Boundary
- Fence
- Building
- Pavement Edge
- Subsurface Communication Line (Abandoned)
- Subsurface Electric Line (Abandoned)
- Subsurface Sanitary Line
- Subsurface Water Line
- Septic
- Subsurface Concrete Structure
- UST (Abandoned)
- Estimated Property Boundary

Notes:

I/C DEC = 10,000 mg/kg
GA LC = 32 mg/kg

Prepared/Date: BJS 08/30/07
Checked/Date: DRP 08/30/07

N
0 5 10 Feet

94TH Regional Readiness Command
AMSA 68 (G) USAR
Lincoln, Rhode Island

KEMRON ENVIRONMENTAL SERVICES

MACTEC

Project 3618-04-8122

Toluene in Soil
0-2 feet bgs
Figure 2-8

MAP 45
LOT 87

- Pure Platinum, LLC

MAP 45
LOT 47B

_ Rhode Island
Airport Corporation

Site 04 - Potential Past Disposal Area

SS-17
SS-18
SS-19
SS-20
SS-12
SS-13
SS-14
SS-11
SS-01
SS-03
SS-05
SS-07
SS-09
SS-15
SS-04
SS-08
SS-02
SS-06
SS-10
SS-16

Former Oil/Water Separator
and Dry Well (Removed 1995)

Legend

Ethylbenzene in Soil (0-2 ft bgs)
mg/kg

- 0.000909 - 0.01
- 0.01 - 0.1
- 0.1 - 1.0
- 1.0 - 3.19
- Ethylbenzene Analyzed in GW (Not Detected)
- Facility Boundary
- Fence
- Building
- Pavement Edge
- Subsurface Communication Line (Abandoned)
- Subsurface Electric Line (Abandoned)
- Subsurface Sanitary Line
- Subsurface Water Line
- Septic
- Subsurface Concrete Structure
- UST (Abandoned)
- Estimated Property Boundary

Notes:

I/C DEC = 10,000 mg/kg
GA LC = 27 mg/kg

Prepared/Date: BJS 08/30/07
Checked/Date: DRP 08/30/07

N
0 5 10 Feet

94TH Regional Readiness Command
AMSA 68 (G) USAR
Lincoln, Rhode Island

KEMRON ENVIRONMENTAL SERVICES

MACTEC

Project 3618-04-8122

Ethylbenzene in Soil
0-2 feet bgs
Figure 2-9

MAP 45
LOT 87

- Pure Platinum, LLC

MAP 45
LOT 47B

_ Rhode Island
Airport Corporation

Site 04 - Potential Past Disposal Area

SS-17
SS-18
SS-19
SS-20
SS-12
SS-13
SS-14
SS-11
SS-01
SS-03
SS-05
SS-07
SS-09
SS-15
SS-04
SS-08
SS-02
SS-06
SS-10
SS-16

Former Oil/Water Separator
and Dry Well (Removed 1995)

Legend

Naphthalene in Soil (0-2 ft bgs)
mg/kg

- 0.00445 - 0.1
- 0.1 - 0.8
- 0.8 - 5.0
- 5.0 - 11.3
- Naphthalene Analyzed in GW (Not Detected)
- Facility Boundary
- Fence
- Building
- Pavement Edge
- Subsurface Communication Line (Abandoned)
- Subsurface Electric Line (Abandoned)
- Subsurface Sanitary Line
- Subsurface Water Line
- Septic
- Subsurface Concrete Structure
- UST (Abandoned)
- Estimated Property Boundary

Notes:
I/C DEC = 10,000 mg/kg
GA LC = 0.8 mg/kg

Prepared/Date: BJS 09/07/07
Checked/Date: DRP 09/07/07

N
0 5 10 Feet

94TH Regional Readiness Command
AMSA 68 (G) USAR
Lincoln, Rhode Island

KEMRON ENVIRONMENTAL SERVICES

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Project 3618-04-8122

Naphthalene in Soil
0-2 feet bgs
Figure 2-10

MAP 45
LOT 87

- Pure Platinum, LLC

MAP 45
LOT 47B

_ Rhode Island
Airport Corporation

Site 04 - Potential Past Disposal Area

SS-17
SS-18
SS-19
SS-20
SS-12
SS-13
SS-14
SS-11
SS-01
SS-03
SS-05
SS-07
SS-09
SS-15
SS-08
SS-04
SS-06
SS-10
SS-02
SS-16

Former Oil/Water Separator
and Dry Well (Removed 1995)

Legend

Cis-1,2 DCE in Soil (0-2 ft bgs)
mg/kg

- 0.0121 - 0.1
- 0.1 - 0.284
- Cis-1,2 DCE Analyzed in GW (Not Detected)
- Facility Boundary
- Fence
- Building
- Pavement Edge
- Subsurface Communication Line (Abandoned)
- Subsurface Electric Line (Abandoned)
- Subsurface Sanitary Line
- Subsurface Water Line
- Septic
- Subsurface Concrete Structure
- UST (Abandoned)
- Estimated Property Boundary

Notes:

I/C DEC = 10,000 mg/kg
GA LC = 1.7 mg/kg

Prepared/Date: BJS 08/31/07
Checked/Date: DRP 08/31/07

N

0 5 10 Feet

94TH Regional Readiness Command
AMSA 68 (G) USAR
Lincoln, Rhode Island

KEMRON ENVIRONMENTAL SERVICES

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Project 3618-04-8122

Cis-1,2 DCE in Soil
0-2 feet bgs
Figure 2-11

MAP 45
LOT 87

- Pure Platinum, LLC

MAP 45
LOT 47B

_ Rhode Island
Airport Corporation

Site 04 - Potential Past Disposal Area

SS-17
SS-18
SS-19
SS-20
SS-12
SS-13
SS-14
SS-11
SS-01
SS-03
SS-05
SS-07
SS-09
SS-15
SS-04
SS-08
SS-02
SS-06
SS-10
SS-16

Former Oil/Water Separator
and Dry Well (Removed 1995)

Legend

TCE in Soil (0-2 ft bgs)
mg/kg

- 0.000853 - 0.001
- 0.001 - 0.00209
- TCE Analyzed in GW (Not Detected)
- Facility Boundary
- Fence
- Building
- Pavement Edge
- Subsurface Communication Line (Abandoned)
- Subsurface Electric Line (Abandoned)
- Subsurface Sanitary Line
- Subsurface Water Line
- Septic
- Subsurface Concrete Structure
- UST (Abandoned)
- Estimated Property Boundary

Notes:

I/C DEC = 520 mg/kg
GA LC = 0.2 mg/kg

Prepared/Date: BJS 08/31/07
Checked/Date: DRP 08/31/07

N

0 5 10 Feet

94TH Regional Readiness Command
AMSA 68 (G) USAR
Lincoln, Rhode Island

KEMRON ENVIRONMENTAL SERVICES

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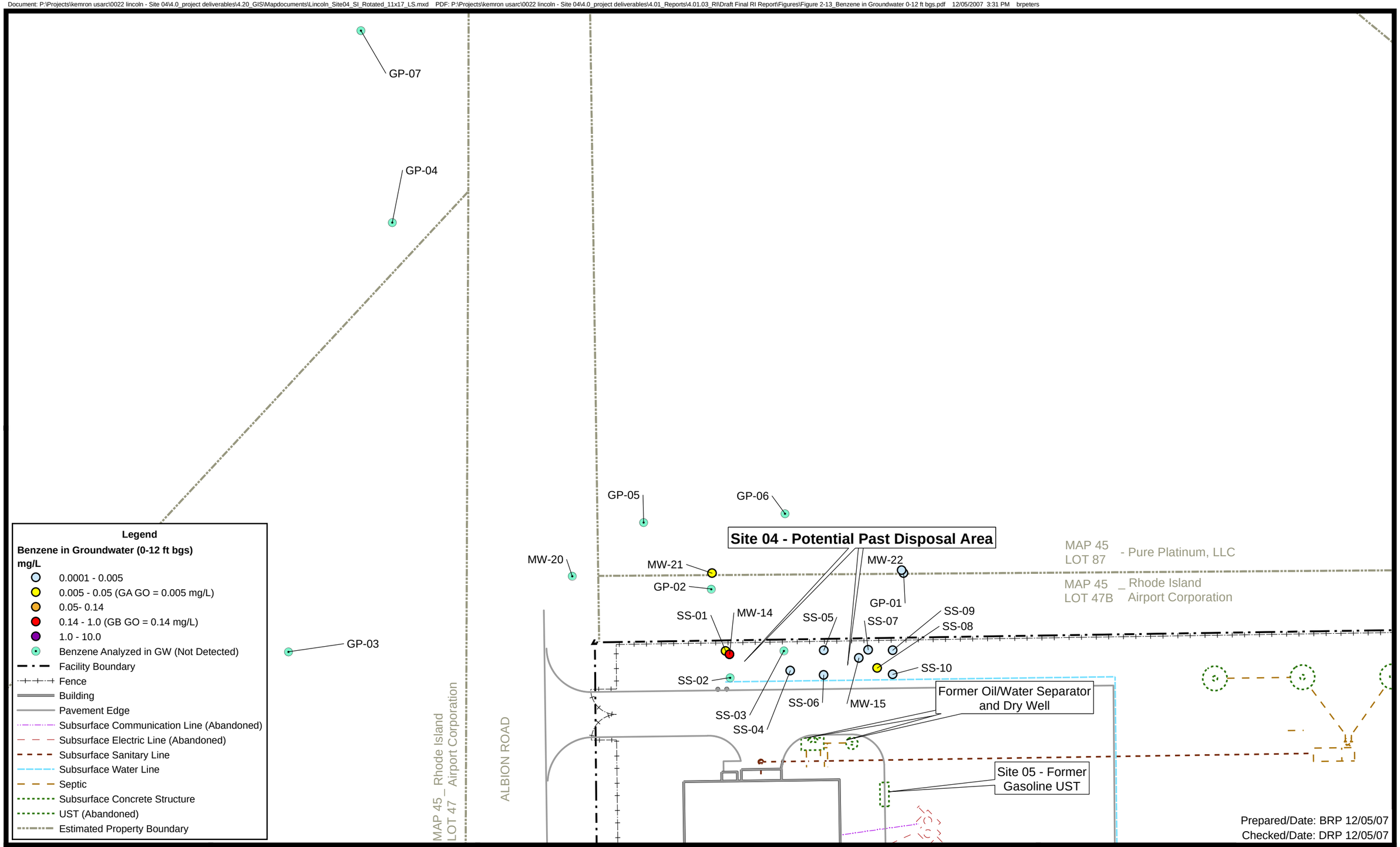
Project 3618-04-8122

TCE in Soil
0-2 feet bgs
Figure 2-12



N

0 20 40 Feet

94TH Regional Readiness Command
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Lincoln, Rhode Island

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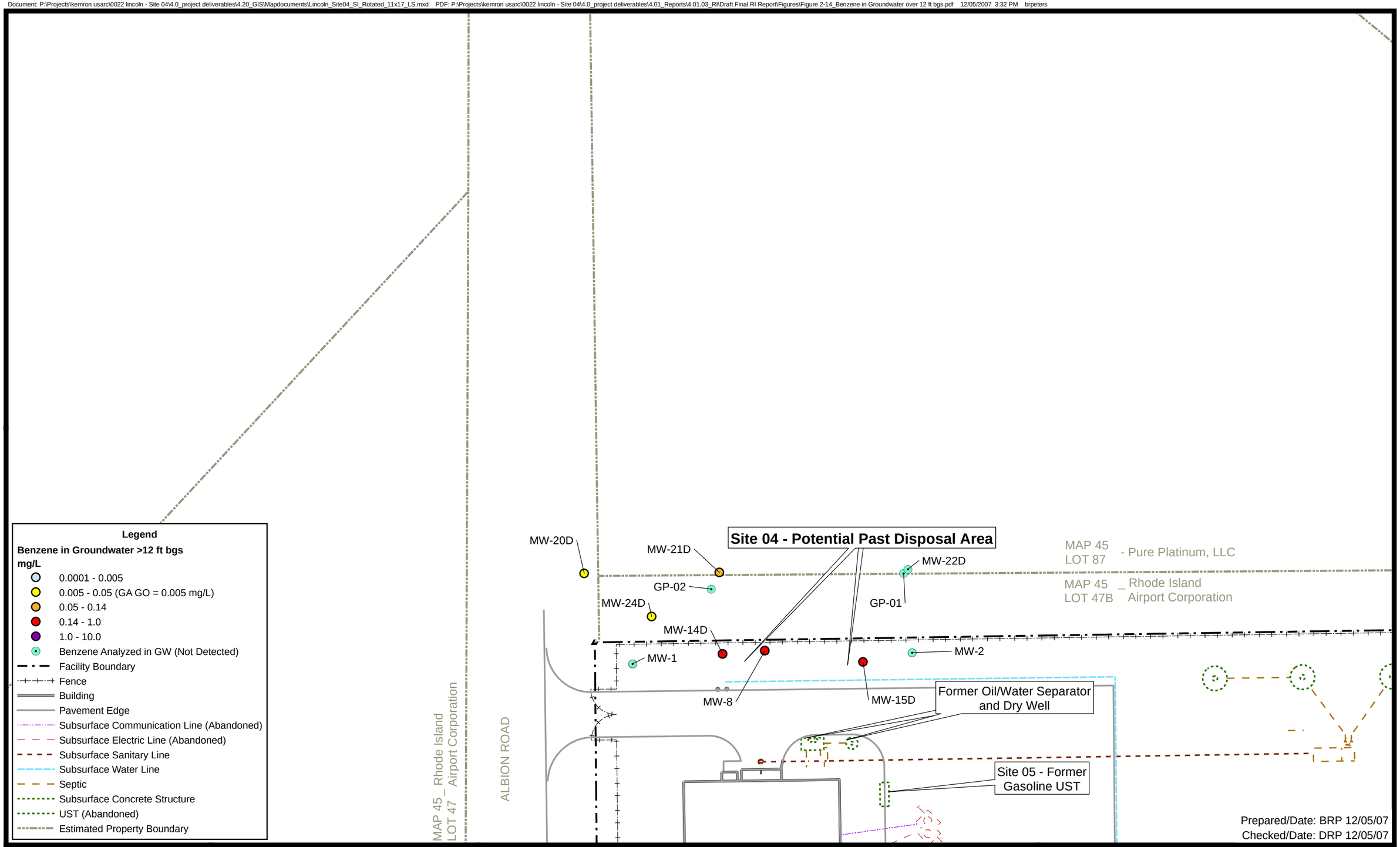
Project 3618-04-8122

Benzene in Groundwater
0 - 12 ft bgs
Figure 2-13



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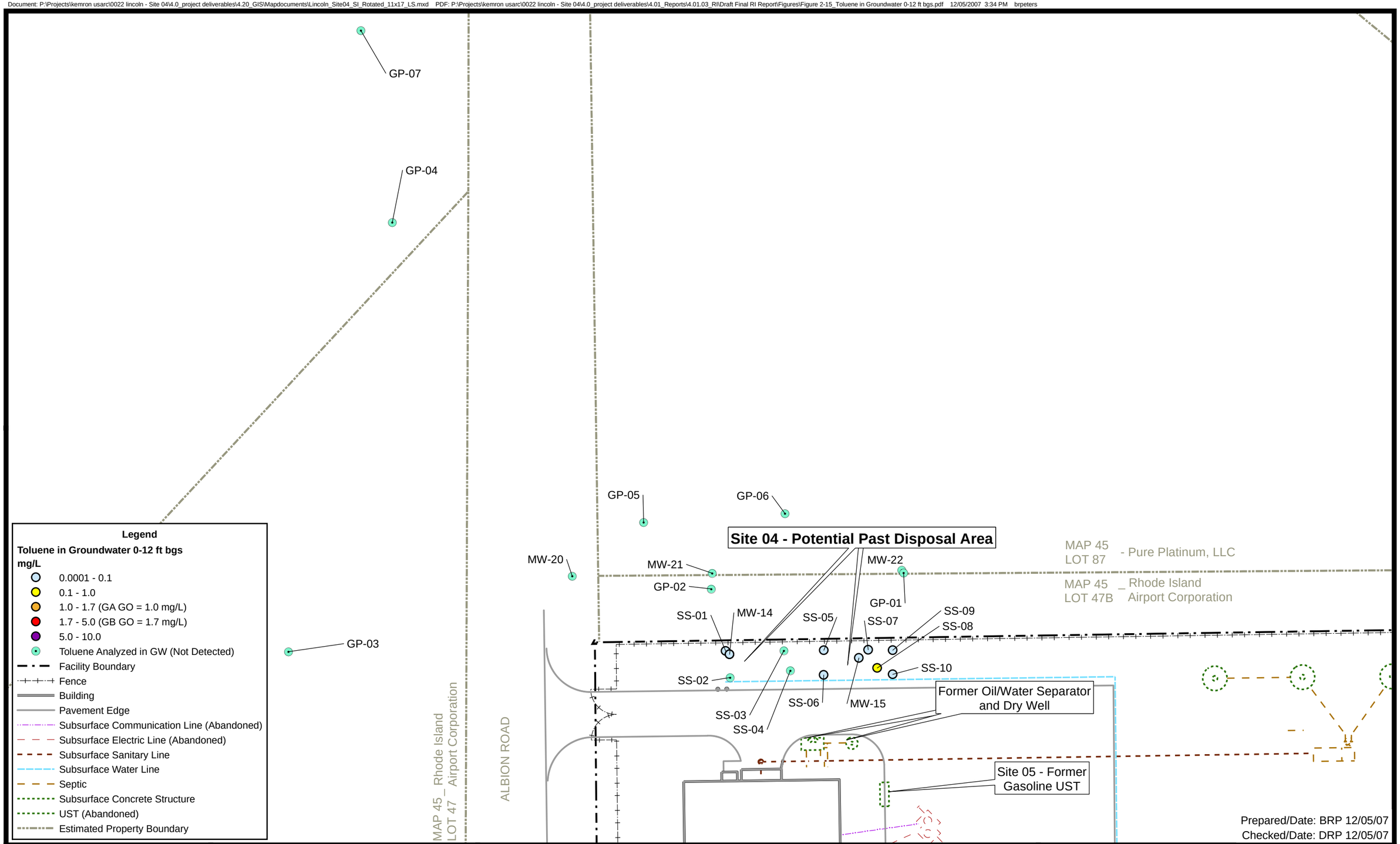
AMSA 68 (G) USAR
Lincoln, Rhode Island

KEMRON ENVIRONMENTAL SERVICES

MACTEC

Project 3618-04-8122

Benzene in Groundwater
> 12 ft bgs
Figure 2-14



N

0 20 40 Feet

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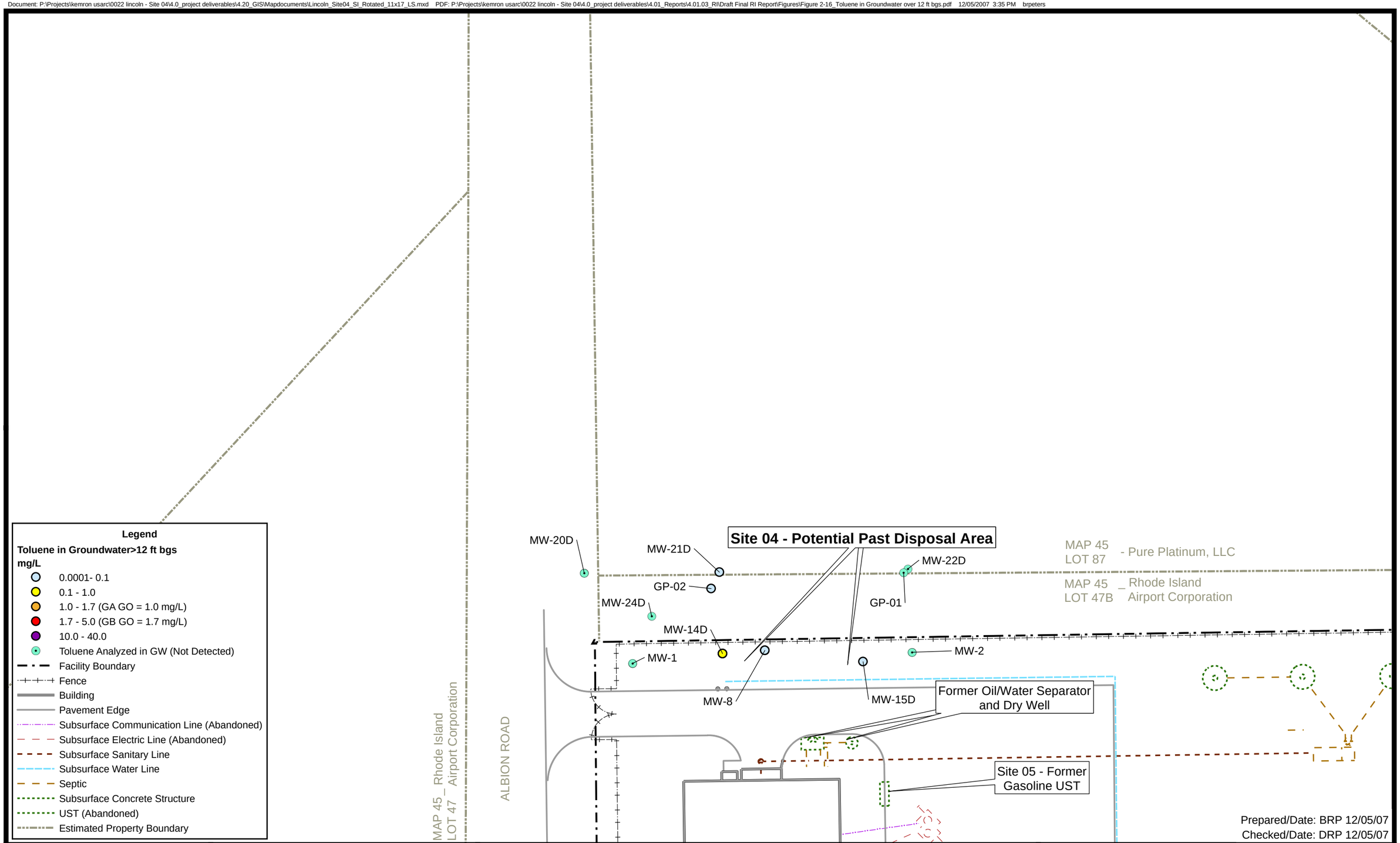
AMSA 68 (G) USAR
Lincoln, Rhode Island

KEMRON ENVIRONMENTAL SERVICES

MACTEC

Project 3618-04-8122

Toluene in Groundwater
0 - 12 ft bgs
Figure 2-15



N

0 20 40 Feet

94TH Regional Readiness Command
AMSA 68 (G) USAR
Lincoln, Rhode Island

KEMRON ENVIRONMENTAL SERVICES

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Project 3618-04-8122

Toluene in Groundwater
> 12 ft bgs
Figure 2-16

GP-07

GP-04

GP-05

GP-06

GP-03

MW-20

MW-21

GP-02

MW-22

GP-01

SS-01

MW-14

SS-05

SS-07

SS-09

SS-08

SS-10

SS-02

SS-03

SS-04

SS-06

MW-15

Site 04 - Potential Past Disposal Area

Former Oil/Water Separator and Dry Well

Site 05 - Former Gasoline UST

MAP 45 LOT 87 - Pure Platinum, LLC

MAP 45 LOT 47B _ Rhode Island Airport Corporation

MAP 45 LOT 47 _ Rhode Island Airport Corporation

ALBION ROAD

Legend

Ethylbenzene in Groundwater 0-12 ft bgs
mg/L

- 0.0001 - 0.1
- 0.1 - 0.7
- 0.7 - 1.6 (GA GO = 0.7 mg/L)
- 1.6 - 5.0 (GB GO = 1.6 mg/L)
- 5.0 - 10.0
- Ethylbenzene Analyzed in GW (Not Detected)
- Facility Boundary
- Fence
- Building
- Pavement Edge
- Subsurface Communication Line (Abandoned)
- Subsurface Electric Line (Abandoned)
- Subsurface Sanitary Line
- Subsurface Water Line
- Septic
- Subsurface Concrete Structure
- UST (Abandoned)
- Estimated Property Boundary

N

0 20 40 Feet

94TH Regional Readiness Command
AMSA 68 (G) USAR
Lincoln, Rhode Island

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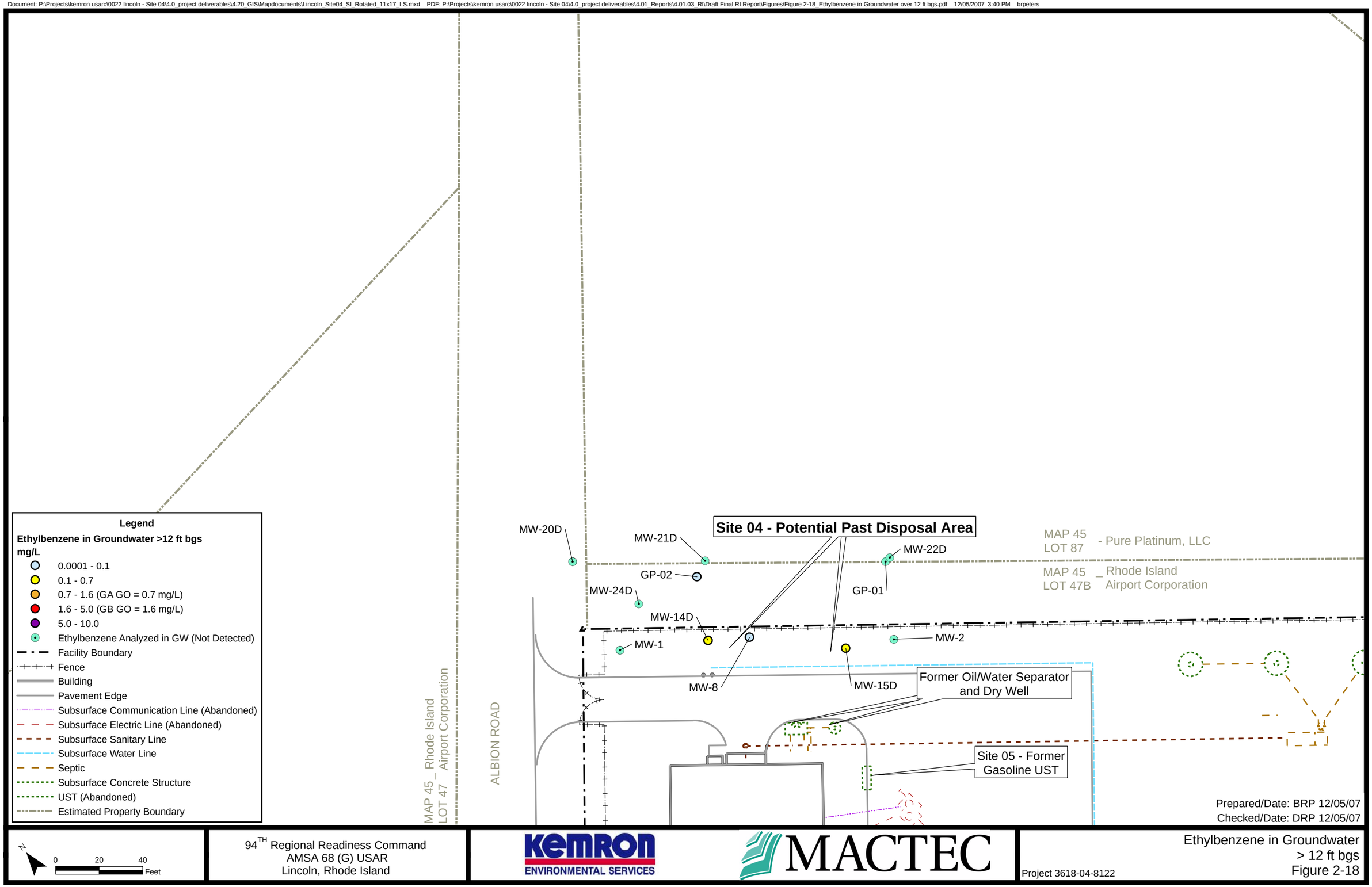
Checked/Date: DRP 12/05/07

Project 3618-04-8122

Ethylbenzene in Groundwater
0 - 12 ft bgs
Figure 2-17



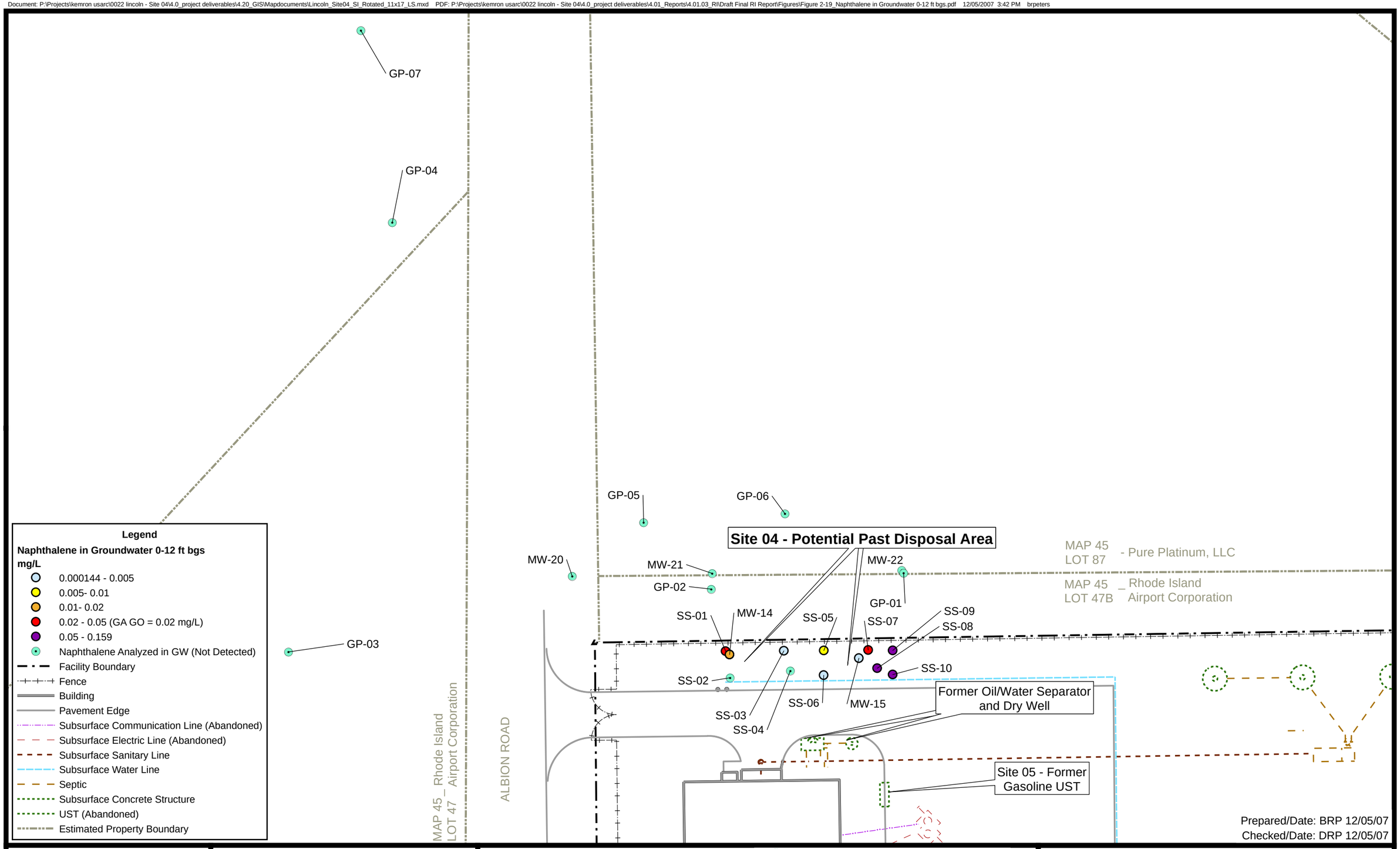
94TH Regional Readiness Command
AMSA 68 (G) USAR
Lincoln, Rhode Island

KEMRON ENVIRONMENTAL SERVICES

MACTEC

Project 3618-04-8122

Ethylbenzene in Groundwater
> 12 ft bgs
Figure 2-18



Prepared/Date: BRP 12/05/07
Checked/Date: DRP 12/05/07

94TH Regional Readiness Command
AMSA 68 (G) USAR
Lincoln, Rhode Island

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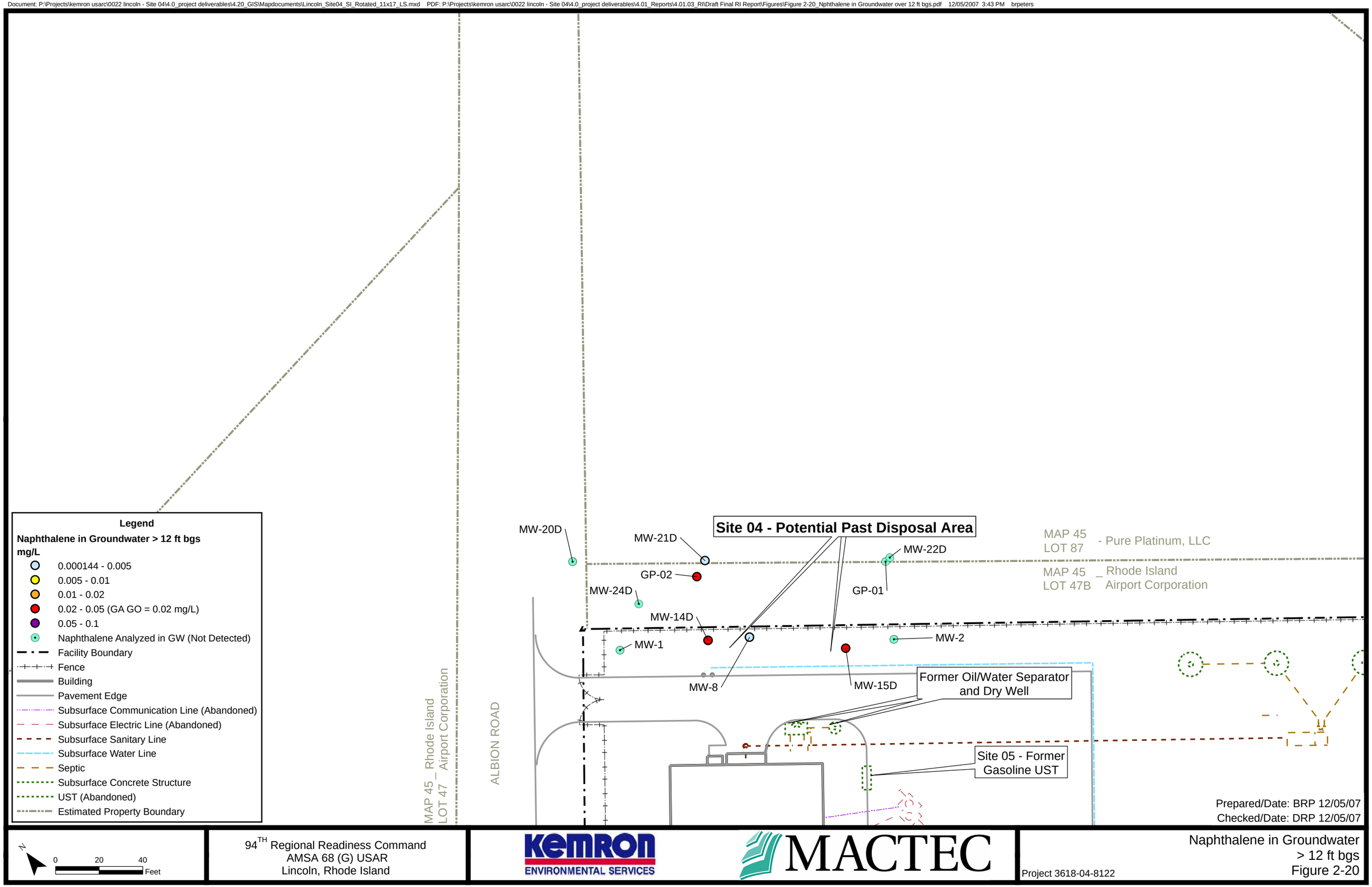
Project 3618-04-8122

Naphthalene in Groundwater
0 - 12 ft bgs
Figure 2-19



94TH Regional Readiness Command
AMSA 68 (G) USAR
Lincoln, Rhode Island

KEMRON ENVIRONMENTAL SERVICES

MACTEC

Project 3618-04-8122

Naphthalene in Groundwater
> 12 ft bgs
Figure 2-20

Table 2-1
Summary of Remedial Investigation Direct-Push Explorations
Site 04 - Potential Past Disposal Area

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

Site No.	Media	Loc Name	Exploration Method	Field Completion Date	Total Depth (ft bgs)	Number of Analytical Samples Collected
04	SOIL	SS-01	GeoProbe™	1/19/2006	4	1
04	SOIL	SS-02	GeoProbe™	1/18/2006	4	1
04	SOIL	SS-03	GeoProbe™	1/18/2006	4	1
04	SOIL	SS-04	GeoProbe™	1/19/2006	4	1
04	SOIL	SS-05	GeoProbe™	1/19/2006	4	1
04	SOIL	SS-06	GeoProbe™	1/19/2006	4	1
04	SOIL	SS-07	GeoProbe™	1/25/2006	12	2
04	SOIL	SS-08	GeoProbe™	1/19/2006	4	1
04	SOIL	SS-09	GeoProbe™	1/24/2006	12	1
04	SOIL	SS-10	GeoProbe™	1/25/2006	4	1
04	SOIL	SS-11	GeoProbe™	5/10/2007	1	1
04	SOIL	SS-12	GeoProbe™	5/10/2007	2	1
04	SOIL	SS-13	GeoProbe™	5/10/2007	2	1
04	SOIL	SS-14	GeoProbe™	5/10/2007	2	1
04	SOIL	SS-15	GeoProbe™	5/10/2007	2	1
04	SOIL	SS-16	GeoProbe™	5/10/2007	1	1
04	SOIL	SS-17	GeoProbe™	5/11/2007	2	1
04	SOIL	SS-18	GeoProbe™	5/11/2007	1	1
04	SOIL	SS-19	GeoProbe™	5/11/2007	2	1
04	SOIL	SS-20	GeoProbe™	5/11/2007	1	1
04	GW	SS-01	GeoProbe™	1/19/2006	4	1
04	GW	SS-02	GeoProbe™	1/18/2006	4	1
04	GW	SS-03	GeoProbe™	1/18/2006	4	1
04	GW	SS-04	GeoProbe™	1/19/2006	4	1
04	GW	SS-05	GeoProbe™	1/19/2006	4	1
04	GW	SS-06	GeoProbe™	1/19/2006	4	1
04	GW	SS-07	GeoProbe™	1/19/2006	12	1
04	GW	SS-08	GeoProbe™	1/20/2006	4	1
04	GW	SS-09	GeoProbe™	1/26/2006	12	1
04	GW	SS-10	GeoProbe™	1/26/2006	4	1
04	GW	GP-01	GeoProbe™	5/17/2007	16	2
04	GW	GP-02	GeoProbe™	5/17/2007	16	2
04	GW	GP-03	GeoProbe™	5/9/2007	5	1
04	GW	GP-04	GeoProbe™	5/9/2007	7.2	1
04	GW	GP-05	GeoProbe™	5/8/2007	8	1
04	GW	GP-06	GeoProbe™	5/8/2007	7.2	1
04	GW	GP-07	GeoProbe™	5/9/2007	8.7	1

NOTES:

bgs - below ground surface
ft - feet
GW - groundwater

Prepared by: RP 07/30/07
Checked by: PJM 07/31/07

Table 2-2
Summary of Remedial Investigation Explorations and Analyses
Site 04 - Potential Past Disposal Area

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

								Analysis/Method						
Site No.	Media	Loc Name	Field Sample Id	Sample Collection Method	Field Sample Date	Top Depth (ft,bgs)	Bottom Depth (ft,bgs)	VOCs /8260B	SVOCs /8270C Modified	MADEP EPH	MADEP VPH	GRO /8015M	DRO /8015M	Lead /6020
04	SOIL	SS-01	RI22-SBS0102	GeoProbe™	1/19/2006	1	2	X		X	X			X
04	SOIL	SS-02	RI22-SBS0202	GeoProbe™	1/18/2006	1	2	X		X	X			X
04	SOIL	SS-03	RI22-SBS0301	GeoProbe™	1/18/2006	0	1	X		X	X			X
04	SOIL	SS-04	RI22-SBS0402	GeoProbe™	1/19/2006	1	2	X		X	X			X
04	SOIL	SS-05	RI22-SBS0502	GeoProbe™	1/18/2006	1	2	X		X	X			X
04	SOIL	SS-06	RI22-SBS0601	GeoProbe™	1/19/2006	0	1	X		X	X			X
04	SOIL	SS-06	RI22-SBS0603	GeoProbe™	1/19/2006	2	3	X		X	X			X
04	SOIL	SS-07	RI22-SBS0702	GeoProbe™	1/19/2006	1	2	X		X	X			X
04	SOIL	SS-07	RI22-SBS0711	GeoProbe™	1/25/2006	10	11	X		X	X			X
04	SOIL	SS-08	RI22-SBS0802	GeoProbe™	1/19/2006	1	2	X		X	X			X
04	SOIL	SS-09	RI22-SBS0902	GeoProbe™	1/24/2006	1	2	X		X	X			X
04	SOIL	SS-10	RI22-SBS1002	GeoProbe™	1/25/2006	1	2	X		X	X			X
04	SOIL	SS-11	RI22-SSS1100	GeoProbe™	5/10/2007	0	1	X				X	X	
04	SOIL	SS-12	RI22-SSS1201	GeoProbe™	5/10/2007	1	2	X				X	X	
04	SOIL	SS-13	RI22-SSS1301	GeoProbe™	5/10/2007	1	2	X				X	X	
04	SOIL	SS-14	RI22-SSS1401	GeoProbe™	5/10/2007	1	2	X				X	X	
04	SOIL	SS-15	RI22-SSS1501	GeoProbe™	5/10/2007	1	2	X				X	X	
04	SOIL	SS-16	RI22-SSS1600	GeoProbe™	5/10/2007	0	1	X				X	X	
04	SOIL	SS-17	RI22-SSS1701	GeoProbe™	5/11/2007	1	2	X				X	X	
04	SOIL	SS-18	RI22-SSS1800	GeoProbe™	5/11/2007	0	1	X				X	X	
04	SOIL	SS-19	RI22-SSS1901	GeoProbe™	5/11/2007	1	2	X				X	X	
04	SOIL	SS-20	RI22-SSS2000	GeoProbe™	5/11/2007	0	1	X				X	X	
04	GW	SS-01	RI22-GWS0101	GeoProbe™	1/19/2006	1	4	X						**Y**
04	GW	SS-02	RI22-GWS0201	GeoProbe™	1/18/2006	1	4	X						**Y**
04	GW	SS-03	RI22-GWS0301	GeoProbe™	1/18/2006	0.3	4	X						**Y**
04	GW	SS-04	RI22-GWS0401	GeoProbe™	1/19/2006	2	4	X						**Y**
04	GW	SS-05	RI22-GWS0501	GeoProbe™	1/19/2006	0.6	4	X						**Y**
04	GW	SS-06	RI22-GWS0601	GeoProbe™	1/19/2006	1.8	4	X						**Y**
04	GW	SS-07	RI22-GWS0701	GeoProbe™	1/19/2006	0.4	4	X						**Y**
04	GW	SS-08	RI22-GWS0801	GeoProbe™	1/19/2006	3.5	4	X						**Y**
04	GW	SS-08	RI22-GWS0801	GeoProbe™	1/20/2006	3.5	4	X						**Y**
04	GW	SS-09	RI22-GWS0901	GeoProbe™	1/26/2006	2	12	X						**Y**
04	GW	SS-10	RI22-GWS1001	GeoProbe™	1/26/2006	1	4	X						**Y**
04	GW	MW-1	RI22-GWSMW101	Mon. Well	1/27/2006	10	20	X						**Y**
04	GW	MW-2	RI22-GWSMW201	Mon. Well	1/30/2006	9	19	X						**Y**
04	GW	MW-8	RI22-GWSMW801	Mon. Well	1/30/2006	6	16	X						**Y**
04	GW	MW-14	RI22-GWSMW1401	Mon. Well	1/30/2006	2	12	X						**Y**
04	GW	MW-15	RI22-GWSMW1501	Mon. Well	1/30/2006	2	12	X						**Y**
04	GW	GP-01	RI 22 GPS 0101	GeoProbe™	5/8/2007	2.5	7.5	X						**Y**

Table 2-2
Summary of Remedial Investigation Explorations and Analyses
Site 04 - Potential Past Disposal Area

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

								Analysis/Method						
Site No.	Media	Loc Name	Field Sample Id	Sample Collection Method	Field Sample Date	Top Depth (ft,bgs)	Bottom Depth (ft,bgs)	VOCs /8260B	SVOCs /8270C Modified	MADEP EPH	MADEP VPH	GRO /8015M	DRO /8015M	Lead /6020
04	GW	GP-01	RI22-GPS0114	GeoProbe™	5/17/2007	14	16	X						
04	GW	GP-02	RI 22 GPS 0201	GeoProbe™	5/8/2007	3.7	7.7	X						**Y**
04	GW	GP-02	RI22-GPS0214	GeoProbe™	5/17/2007	14	16	X						
04	GW	GP-03	RI22-GPS0301	GeoProbe™	5/9/2007	3.1	5	X						**Y**
04	GW	GP-04	RI22-GPS0401	GeoProbe™	5/9/2007	5.7	7.2	X						**Y**
04	GW	GP-05	RI 22 GPS 0501	GeoProbe™	5/8/2007	4	8	X						**Y**
04	GW	GP-06	RI 22 GPS 0601	GeoProbe™	5/8/2007	3.6	7.2	X						**Y**
04	GW	GP-07	RI22-GPS0701	GeoProbe™	5/9/2007	4.5	8.7	X						**Y**
04	GW	MW-1	RI22-GWSMW102	Mon. Well	6/26/2007	6	16	X						
04	GW	MW-2	RI22-GWSMW202	Mon. Well	6/26/2007	6	16	X						
04	GW	MW-8	RI22-GWSMW802	Mon. Well	6/27/2007	6	16	X						
04	GW	MW-14	RI22-GWSMW1402	Mon. Well	6/27/2007	2	12	X						
04	GW	MW-14D	RI22-MWS14D01	Mon. Well	5/18/2007	10	20	X						
04	GW	MW-14D	RI23-GWSMW14D02	Mon. Well	6/26/2007	10	20	X						
04	GW	MW-15	RI23-GWSMW1502	Mon. Well	6/26/2007	2	12	X						
04	GW	MW-15D	RI23-GWSMW15D02	Mon. Well	6/25/2007	10.2	15.2	X						
04	GW	MW-20	RI22-GWSM2002	Mon. Well	6/26/2007	2	12	X						
04	GW	MW-20D	RI22-MWS20D01	Mon. Well	5/31/2007	10	20	X						
04	GW	MW-20D	RI23-GWSMW20D02	Mon. Well	6/26/2007	10	20	X						
04	GW	MW-21	RI22-GWSMW2102	Mon. Well	6/26/2007	2	12	X						
04	GW	MW-21D	RI23-GWSMW21D02	Mon. Well	6/26/2007	12.5	17.5	X						
04	GW	MW-22	RI23-GWSMW2202	Mon. Well	6/27/2007	2	12	X						
04	GW	MW-22D	RI23-GWSMW22D02	Mon. Well	6/27/2007	12	17	X						

NOTES:

bgs - below ground surface
Bkgd - background
DRO - diesel range organics
EPH - extractable petroleum hydrocarbons
ft - feet
GRO - gasoline range organics
GW - groundwater
MADEP - Massachussetts Department of Environmental Protection
PID - photoionization detector
SVOCs - semivolatile organic compounds
VOCs - volatile organic compouds
VPH - volatile petroleum hydrocarbons
X - sample collected
Y - unfiltered and filtered (total and dissolved fractions) sample collected

Table 2-3
Monitoring Well Details
Site 04 - Potential Past Disposal Area

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

Site No.	Location	Co-Located Direct-Push Exploration	Installation Date	Borehole Diameter (inches)	Well Material	Well ID (inches)	Well Screen Slot Size (inches)	Well Screen Length (ft)	Top of Screen (ft,bgs)	Bottom of Screen (ft,bgs)
04	MW-1		1986		Sch. 40 PVC			10	6	16
04	MW-2		1986		Sch. 40 PVC			10	6	16
04	MW-8		3/20/2003	8.5	Sch. 40 PVC	2	0.02	10	6	16
04	MW-14	SS-01	1/24/2006	2	Sch. 40 PVC	1	0.01	10	2	12
04	MW-14D		5/17/2007	7	Sch. 40 PVC	1	0.01	10	10	20
04	MW-15		1/25/2006	2	Sch. 40 PVC	1	0.01	10	2	12
04	MW-15D		6/7/2007	7	Sch. 40 PVC	1	0.01	5	10.2	15.2
04	MW-20		5/16/2007	3	Sch. 40 PVC	1	0.01	10	2	12
04	MW-20D		5/17/2007	2	Sch. 40 PVC	1	0.01	10	10	20
04	MW-21		5/16/2007	3	Sch. 40 PVC	1	0.01	10	2	12
04	MW-21D		6/7/2007	7	Sch. 40 PVC	1	0.01	5	12.5	17.5
04	MW-22		5/16/2007	3	Sch. 40 PVC	1	0.01	10	2	12
04	MW-22D		6/8/2007	7	Sch. 40 PVC	1	0.01	5	12	17
05	MW-24D		6/8/2007	2	Sch. 40 PVC	1	0.01	5	10	15

NOTES

bgs - below ground surface
ft - feet
ID - inside diameter
GW - groundwater
Sch. 40 PVC - schedule 40 polyvinyl chloride

Table 2-4
Groundwater Elevations
Sites 04, 05, and 13

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

Well ID	Top of PVC Elevation (ft,MSL)	May 23, 2007 Depth to GW from top of PVC (ft)	June 25, 2007 Depth to GW from top of PVC (ft)	May 23, 2007 Groundwater Elevation (ft,MSL)	June 25, 2007 Groundwater Elevation (ft,MSL)
EW-1	449.11	2.2	5.96	446.91	443.15
EW-3	448.82	2.68	5.72	446.14	443.10
MW-1	449.20	4.39	7.50	444.81	441.70
MW-2	449.78	4.35	7.11	445.43	442.67
MW-3	449.83	4.71	8.08	445.12	441.75
MW-4	450.19	3.33	5.78	446.86	444.41
MW-5	450.15	4.79	7.57	445.36	442.58
MW-6B	449.63	3.5	7.02	446.13	442.61
MW-6D	449.55	5.16	7.94	444.39	441.61
MW-6S	449.15	2.79	6.43	446.36	442.72
MW-7	449.58	3.45	6.70	446.13	442.88
MW-8	449.67	4.36	7.32	445.31	442.35
MW-9	447.60	1.88	4.57	445.72	443.03
MW-10	447.79	3.17	4.98	444.62	442.81
MW-10D	447.60		6.14		441.46
MW-11	449.47	4.08	7.43	445.39	442.04
MW-12	447.04	0.7	2.64	446.34	444.40
MW-13	449.91	3.35	6.04	446.56	443.87
MW-14	449.67	4.48	7.41	445.19	442.26
MW-14D	447.19	2	4.99	445.19	442.20
MW-15	449.98	3.76	7.38	446.22	442.60
MW-15D	447.60		5.21		442.39
MW-16	447.72	2.4	5.36	445.32	442.36
MW-16D	447.45		5.31		442.14
MW-17	447.63	2.17	4.81	445.46	442.82
MW-17D	447.33		4.65		442.68

Table 2-4
Groundwater Elevations
Sites 04, 05, and 13

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

Well ID	Top of PVC Elevation (ft,MSL)	May 23, 2007 Depth to GW from top of PVC (ft)	June 25, 2007 Depth to GW from top of PVC (ft)	May 23, 2007 Groundwater Elevation (ft,MSL)	June 25, 2007 Groundwater Elevation (ft,MSL)
MW-18	450.42	4.67	7.62	445.75	442.80
MW-18D	448.05		5.01		443.04
MW-19	447.78	2.21	4.75	445.57	443.03
MW-20	447.02	3.28	6.49	443.74	440.53
MW-20D	447.51	3.8	6.87	443.71	440.64
MW-21	446.80	1.91	5.08	444.89	441.72
MW-21D	446.66		4.79		441.87
MW-22	446.61	1.39	4.24	445.22	442.37
MW-22D	446.73		4.35		442.38
MW-23	448.38		5.22		443.16
MW-24D	447.36		6.04		441.32
MW-26D	448.43		5.56		442.87
MW-27	447.25		4.17		443.08
MW-27D	447.44		4.34		443.10

NOTES:
Montioring well PVC elevations surveyed May and June 2007 by ASEC Corp.
PVC - polyvinyl chloride
ft - feet
MSL - mean sea level

Table 2-5
Detected Analytes in Soil
Site 04 - PDA

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

param_name	RIDEM I/C DEC (mg/kg)	RIDEM GA LC (mg/kg)	SS-01 RI22-SBS0102 1/19/2006 1-2 ft	SS-02 RI22-SBS0202 1/18/2006 1-2 ft	SS-03 RI22-SBS0301 1/18/2006 0-1 ft	SS-04 RI22-SBS0402 1/19/2006 1-2 ft	SS-05 RI22-SBS0502 1/18/2006 1-2 ft	SS-06 RI22-SBS0601 1/19/2006 0-1 ft	SS-06 RI22-SBS0603 1/19/2006 2-3 ft	SS-07 RI22-SBS0702 1/19/2006 1-2 ft	SS-07 RI22-SBS0711 1/25/2006 10-11 ft	SS-08 RI22-SBS0802 1/19/2006 1-2 ft
Phenanthrene	10000		**0.724**	0.62 U	**0.959**	0.66 U	**1.56**	0.56 U	0.68 U	**0.561 J**	**0.565**	0.61 U
Pyrene	10000		0.57 U	0.62 U	0.59 U	0.66 U	0.6 U	**0.491 J**	0.68 U	0.62 U	0.52 U	0.61 U
C11-C22 Aromatics			**398**	**28.4**	**1240**	**22.2 J**	**398**	**35.1**	**26 J**	**154**	**625**	**43.7**
C11-C22 Aromatics (unadj.)			**409**	**29.2**	**1240**	**23.8 J**	**415**	**39.5**	**30.2**	**162**	**632**	**47.9**
C19-C36 Aliphatics			**2090**	**40**	**4410**	**13.1**	**758**	**70.4**	**15.9**	**660**	**1210**	**182 J**
C9-C18 Aliphatics			**396**	**12.4**	**1770**	**67.4**	**4170**	**15.5**	**21.4**	**1360**	**1860**	**256 J**
TPH (calculated) (mg/kg)	**2500**	**500**	**3307**	**81.6**	**8293**	**390**	**10869**	**125**	**67.5**	**2915**	**3914**	**782**

Table 2-5
Detected Analytes in Soil
Site 04 - PDA

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

param_name	RIDEM I/C DEC (mg/kg)	RIDEM GA LC (mg/kg)	SS-09 RI22-SBS0902 1/24/2006 1-2 ft	SS-10 RI22-SBS1002 1/25/2006 1-2 ft	SS-11 RI22-SSS1100 5/10/2007 0-1 ft	SS-12 RI22-SSS1201 5/10/2007 1-2 ft	SS-13 RI22-SSS1301 5/10/2007 1-2 ft	SS-14 RI22-SSS1401 5/10/2007 1-2 ft	SS-15 RI22-SSS1501 5/10/2007 1-2 ft	SS-16 RI22-SSS1600 5/10/2007 0-1 ft	SS-17 RI22-SSS1701 5/11/2007 1-2 ft	SS-18 RI22-SSS1800 5/11/2007 0-1 ft
Volatile Organics (mg/Kg)												
1,1,1-Trichloroethane	10000	11	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U	0.066 U	0.0677 U	0.0704 U	0.0443 U
1,2,4-Trimethylbenzene			**54.8 J**	**54.7 J**	0.0685 U	0.0783 U	**6.83**	**3.71**	**0.11**	0.0677 U	0.0704 U	0.0443 U
1,3,5-Trimethylbenzene			**29.6 J**	**31.9 J**	0.0685 U	0.0783 U	**2.63**	**2.01**	0.066 U	0.0677 U	0.0704 U	0.0443 U
2-Butanone	10000		2.99 U	5.59 U	1.71 U	1.96 U	1.99 U	1.81 U	1.65 U	1.69 U	1.76 U	1.11 U
4-iso-Propyltoluene			**7.82 J**	**8.38 J**	0.0685 U	0.0783 U	**0.263**	**5.84**	0.066 U	0.0677 U	0.0704 U	0.0443 U
Acetone	10000		R	R	1.71 U	1.96 U	1.99 U	1.81 U	1.65 U	1.69 U	1.76 U	1.11 U
Benzene	200	0.2	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U	0.066 U	0.0677 U	0.0704 U	0.0443 U
Cis-1,2-Dichloroethene	10000	1.7	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U	0.066 U	0.0677 U	0.0704 U	0.0443 U
Ethyl benzene	10000	27	**0.537 J**	**0.579 J**	0.0685 U	0.0783 U	**0.212**	**0.103**	0.066 U	0.0677 U	0.0704 U	0.0443 U
Isopropylbenzene	10000		**1.05 J**	**1.19 J**	0.0685 U	0.0783 U	**0.276**	**0.145**	0.066 U	0.0677 U	0.0704 U	0.0443 U
Naphthalene	10000	**0.8**	**9.76 J**	**9.91 J**	0.0685 U	0.0783 U	**0.623**	**0.799**	**0.316**	0.0677 U	0.0704 U	0.0443 U
n-Butylbenzene			**14.8 J**	**18.8 J**	0.0685 U	0.0783 U	0.0797 U	0.0726 U	0.066 U	0.0677 U	0.0704 U	0.0443 U
o-Xylene			**1.51 J**	**1.3 J**	0.0685 U	0.0783 U	**0.44**	**0.492**	0.066 U	0.0677 U	0.0704 U	0.0443 U
Propylbenzene			**4.67 J**	**4.22 J**	0.0685 U	0.0783 U	**0.931**	**0.405**	0.066 U	0.0677 U	0.0704 U	0.0443 U
sec-Butylbenzene			**3.04 J**	**3.84 J**	0.0685 U	0.0783 U	**0.25**	**0.222**	0.066 U	0.0677 U	0.0704 U	0.0443 U
tert-Butylbenzene			**0.95 J**	**1.37 J**	0.0685 U	0.0783 U	0.0797 U	0.0726 U	0.066 U	0.0677 U	0.0704 U	0.0443 U
Toluene	10000	32	**0.223 J**	2.79 U	0.0685 U	0.0783 U	**0.132**	**0.222**	0.066 U	0.0677 U	0.0704 U	0.0443 U
trans-1,2-Dichloroethene	10000	3.3	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U	0.066 U	0.0677 U	0.0704 U	0.0443 U
Trichloroethene	520	0.2	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U	0.066 U	0.0677 U	0.0704 U	0.0443 U
Xylene, m/p			**2.49 J**	**1.39 J**	0.137 U	0.157 U	**0.62**	**0.449**	0.132 U	0.135 U	0.141 U	0.0886 U
Xylenes, Total	10000	540			0.206 U	0.235 U	**1.06**	**0.941**	0.198 U	0.203 U	0.211 U	0.133 U
Inorganics (mg/Kg)												
Lead	500		**23.4**	**30.3**								
Percent Solids **(%)**			**84.3**	**84.7**								
TPH (mg/Kg)												
Diesel Range Organics					46.5 U	**68.5**	**625**	**2750**	**1170**	**90**	46.4 U	38.7 U
Gasoline Range Organics					1.61 U	**4.24**	**50.8**	**126**	**6.02**	**7.06**	1.83 U	1.15 U
VPH (mg/Kg)												
Ethyl benzene	10000	27	0.61 U	0.76 U								
Naphthalene	10000	**0.8**	**6.2**	**9.95**								
o-Xylene			**4.71**	**3.26**								
Toluene	10000	32	0.61 U	0.76 U								
Xylene, m/p			**2.16**	**1.11**								
C5-C8 Aliphatics			**13**	**16.2**								
C5-C8 Aliphatics (unadj.)			**13.3**	**16.3**								
C9-C10 Aromatics (unadj.)			**550**	**675**								
C9-C12 Aliphatics			**318**	**422**								
C9-C12 Aliphatics (unadj.)			**875**	**1100**								
EPH (mg/Kg)												
2-Methylnaphthalene	10000		**4.69**	**7.46**								
Acenaphthene	10000		**0.644**	**0.778**								
Benzo(ghi)perylene	10000		0.58 U	**0.465 J**								
Fluoranthene	10000		0.58 U	0.57 U								
Fluorene	10000		**0.631**	**1.67**								
Naphthalene	10000	**0.8**	**3.33**	**3.42**								

Table 2-5
Detected Analytes in Soil
Site 04 - PDA

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

param_name	RIDEM I/C DEC (mg/kg)	RIDEM GA LC (mg/kg)	SS-09 RI22-SBS0902 1/24/2006 1-2 ft	SS-10 RI22-SBS1002 1/25/2006 1-2 ft	SS-11 RI22-SSS1100 5/10/2007 0-1 ft	SS-12 RI22-SSS1201 5/10/2007 1-2 ft	SS-13 RI22-SSS1301 5/10/2007 1-2 ft	SS-14 RI22-SSS1401 5/10/2007 1-2 ft	SS-15 RI22-SSS1501 5/10/2007 1-2 ft	SS-16 RI22-SSS1600 5/10/2007 0-1 ft	SS-17 RI22-SSS1701 5/11/2007 1-2 ft	SS-18 RI22-SSS1800 5/11/2007 0-1 ft
Phenanthrene	10000		**0.471 J**	**1.43**								
Pyrene	10000		0.58 U	0.57 U								
C11-C22 Aromatics			**878**	**596**								
C11-C22 Aromatics (unadj.)			**888**	**613**								
C19-C36 Aliphatics			**4870**	**808**								
C9-C18 Aliphatics			**4380**	**2730**								
TPH (calculated) (mg/kg)	**2500**	**500**	**11576**	**5942**		**72.7**	**676**	**2876**	**1176**	**97.1**		

Table 2-5
Detected Analytes in Soil
Site 04 - PDA

Lincoln, Rhode Island
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param_name	RIDEM I/C DEC (mg/kg)	RIDEM GA LC (mg/kg)	SS-01 RI22-SBS0102 1/19/2006 1-2 ft	SS-02 RI22-SBS0202 1/18/2006 1-2 ft	SS-03 RI22-SBS0301 1/18/2006 0-1 ft	SS-04 RI22-SBS0402 1/19/2006 1-2 ft	SS-05 RI22-SBS0502 1/18/2006 1-2 ft	SS-06 RI22-SBS0601 1/19/2006 0-1 ft	SS-06 RI22-SBS0603 1/19/2006 2-3 ft	SS-07 RI22-SBS0702 1/19/2006 1-2 ft	SS-07 RI22-SBS0711 1/25/2006 10-11 ft	SS-08 RI22-SBS0802 1/19/2006 1-2 ft
Volatile Organics (mg/Kg)												
1,1,1-Trichloroethane	10000	11	0.75 U	0.00309 J	0.00613 U	0.697 U	**0.00108 J**	0.00533 UJ	0.00764 U	0.00601 U	0.528 U	0.671 U
1,2,4-Trimethylbenzene			**8.13**	0.00599 U	**0.0992 J**	**8.45**	**1030**	**0.00134 J**	**0.0839 J**	**20.3 J**	**15**	**17.6**
1,3,5-Trimethylbenzene			**3.56**	0.00599 U	**0.0576 J**	**4.59**	**326**	0.00533 U	0.00453 J	**11.5 J**	**6.35**	**8.01**
2-Butanone	10000		R	**0.00592 J**	**0.0154 J**	R	**0.0646 J**	0.0107 UJ	0.0153 U	**0.0154 J**	1.06 U	R
4-iso-Propyltoluene			0.645 J	0.00599 U	**0.0166 J**	**0.763**	**56.2 J**	0.00533 U	0.00764 U	**2.96 J**	**1.39**	**1.24**
Acetone	10000		R	**0.0706**	**0.0763 J**	R	**0.195 J**	0.0107 UJ	0.0153 U	**0.0736 J**	R	R
Benzene	200	0.2	0.75 U	0.00599 U	0.00613 U	0.697 U	**0.012 J**	0.00533 UJ	0.00764 U	**0.000927 J**	0.528 U	0.671 U
Cis-1,2-Dichloroethene	10000	1.7	0.75 U	0.00599 U	0.00613 U	0.697 U	**0.0135 J**	0.00533 UJ	0.00764 U	**0.0121 J**	0.528 U	**0.284 J**
Ethyl benzene	10000	27	**1.05**	0.00599 U	**0.00334 J**	0.697 U	**0.105 J**	0.00533 U	0.00764 U	**0.0108 J**	**2.44**	**0.546 J**
Isopropylbenzene	10000		**0.305 J**	0.00599 U	**0.00601 J**	**0.455 J**	**25 J**	0.00533 U	**0.00792 J**	**0.0586 J**	**0.916**	**0.43 J**
Naphthalene	10000	**0.8**	**1.92**	0.012 U	**0.0265 J**	**0.106 J**	**7.03 J**	**0.00445 J**	**0.00771 J**	**1.91 J**	**2.17**	**0.56 J**
n-Butylbenzene			**1.26**	0.00599 U	**0.0408 J**	**0.695 J**	**53 J**	0.00533 U	**0.00136 J**	**4.53 J**	**3.09**	**1.7**
o-Xylene			**2.12**	0.00599 U	**0.00806 J**	0.697 U	**29.6 J**	0.00533 U	**0.00112 J**	**0.0374 J**	**2.45**	**0.907**
Propylbenzene			**0.908**	0.00599 U	**0.0154 J**	**1.37**	**77.5 J**	0.00533 U	**0.00934 J**	**0.215 J**	**2.42**	**1.53**
sec-Butylbenzene			**0.393 J**	0.00599 U	**0.0181 J**	**0.567 J**	**34 J**	0.00533 U	**0.00345 J**	**0.133 J**	**0.998**	**0.56 J**
tert-Butylbenzene			0.75 U	0.00599 U	**0.00164 J**	**0.0763 J**	**4.8 J**	0.00533 U	**0.00175 J**	**0.0328 J**	**0.153 J**	**0.127 J**
Toluene	10000	32	**0.0916 J**	0.00599 U	**0.000909 J**	0.697 U	**1.12 J**	0.00533 U	**0.00101 J**	**0.00969 J**	0.528 U	**0.462 J**
trans-1,2-Dichloroethene	10000	3.3	0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 UJ	0.00764 U	0.00601 U	0.528 U	**0.0947 J**
Trichloroethene	520	0.2	0.75 U	**0.000853 J**	0.00613 U	0.697 U	**0.00209 J**	0.00533 UJ	0.00764 U	0.00601 U	0.528 U	0.671 U
Xylene, m/p			**3.36**	0.00599 U	**0.00443 J**	**0.072 J**	**8.59 J**	0.00533 U	**0.000823 J**	**0.0615 J**	**7.78**	**2**
Xylenes, Total	10000	540										
Inorganics (mg/Kg)												
Lead	500		**15.1 J**	**43.5**	**124**	**16.7 J**	**10.5**	**86.1 J**	**16.7 J**	**16 J**	**7.49**	**12.6 J**
Percent Solids **(%)**			**84.4**	**77.1**	**83.6**	**75.7**	**80.8**	**84.8**	**72.1**	**78.2**	**91.4**	**80.7**
TPH (mg/Kg)												
Diesel Range Organics												
Gasoline Range Organics												
VPH (mg/Kg)												
Ethyl benzene	10000	27	**1.68**	0.7 U	0.54 U	0.78 U	0.8 U	0.67 U	0.9 U	0.62 U	0.56 U	**1.2**
Naphthalene	10000	**0.8**	**4.51**	0.7 U	**4.37**	0.78 U	**11.3**	0.67 U	0.9 U	**2.76**	**1.05**	**1.71**
o-Xylene			**1.89**	0.7 U	**1.89**	0.78 U	**34.1**	0.67 U	0.9 U	**0.434 J**	**1.26**	**0.919**
Toluene	10000	32	0.67 U	0.7 U	0.54 U	0.78 U	**0.694 J**	0.67 U	0.9 U	0.62 U	0.56 U	**3.19**
Xylene, m/p			**3.37**	0.7 U	**0.458 J**	0.78 U	**7.95**	0.67 U	0.9 U	**0.572 J**	**2.18**	**2.47**
C5-C8 Aliphatics			13 U	14 U	**17.8**	16 U	**85.7**	13 U	18 U	12 U	**11.8**	14 U
C5-C8 Aliphatics (unadj.)			13 U	14 U	**18**	16 U	**86.4**	13 U	18 U	12 U	**11.9**	14 U
C9-C10 Aromatics (unadj.)			**156**	14 U	**306**	**86.4**	**1710**	13 U	18 U	**242**	**69.1**	**120**
C9-C12 Aliphatics			**92.6**	14 U	**241**	**112**	**1980**	13 U	18 U	**248**	**58.9**	**52.1**
C9-C12 Aliphatics (unadj.)			**256**	14 U	**549**	**199**	**3730**	13 U	18 U	**491**	**131**	**176**
EPH (mg/Kg)												
2-Methylnaphthalene	10000		**5.19**	0.62 U	**2.05**	0.66 U	**6.75**	0.56 U	0.68 U	**1.96**	**3.7**	0.61 U
Acenaphthene	10000		**0.734**	0.62 U	0.59 U	0.66 U	0.6 U	0.56 U	0.68 U	**0.498 J**	**0.603**	0.61 U
Benzo(ghi)perylene	10000		**0.558 J**	0.62 U	**1.31**	**0.687**	**0.625**	**0.823**	**2.27**	**1.84**	0.52 U	**1.35**
Fluoranthene	10000		0.57 U	0.62 U	0.59 U	0.66 U	0.6 U	**0.642**	0.68 U	0.62 U	0.52 U	0.61 U
Fluorene	10000		**0.806**	0.62 U	**1.08**	0.66 U	**1.47**	0.56 U	0.68 U	0.62 U	**0.63**	0.61 U
Naphthalene	10000	**0.8**	**1.63 J**	0.62 U	**0.474 J**	0.66 UJ	**4.8**	0.56 UJ	0.68 UJ	**2.02 J**	**1.17**	**1.85 J**

Table 2-5
Detected Analytes in Soil
Site 04 - PDA

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

param_name	RIDEM I/C DEC (mg/kg)	RIDEM GA LC (mg/kg)	SS-19 RI22-SSS1901 5/11/2007 1-2 ft	SS-20 RI22-SSS2000 5/11/2007 0-1 ft
Volatile Organics (mg/Kg)				
1,1,1-Trichloroethane	10000	11	0.0762 U	0.0487 U
1,2,4-Trimethylbenzene			0.0762 U	0.0487 U
1,3,5-Trimethylbenzene			0.0762 U	0.0487 U
2-Butanone	10000		1.9 U	1.22 U
4-iso-Propyltoluene			0.0762 U	0.0487 U
Acetone	10000		1.9 U	1.22 U
Benzene	200	0.2	0.0762 U	0.0487 U
Cis-1,2-Dichloroethene	10000	1.7	0.0762 U	0.0487 U
Ethyl benzene	10000	27	0.0762 U	0.0487 U
Isopropylbenzene	10000		0.0762 U	0.0487 U
Naphthalene	10000	**0.8**	0.0762 U	0.0487 U
n-Butylbenzene			0.0762 U	0.0487 U
o-Xylene			0.0762 U	0.0487 U
Propylbenzene			0.0762 U	0.0487 U
sec-Butylbenzene			0.0762 U	0.0487 U
tert-Butylbenzene			0.0762 U	0.0487 U
Toluene	10000	32	0.0762 U	0.0487 U
trans-1,2-Dichloroethene	10000	3.3	0.0762 U	0.0487 U
Trichloroethene	520	0.2	0.0762 U	0.0487 U
Xylene, m/p			0.152 U	0.0973 U
Xylenes, Total	10000	540	0.228 U	0.146 U
Inorganics (mg/Kg)				
Lead	500			
Percent Solids **(%)**				
TPH (mg/Kg)				
Diesel Range Organics			47.7 U	40.8 U
Gasoline Range Organics			2.22 U	**1.92**
VPH (mg/Kg)				
Ethyl benzene	10000	27		
Naphthalene	10000	**0.8**		
o-Xylene				
Toluene	10000	32		
Xylene, m/p				
C5-C8 Aliphatics				
C5-C8 Aliphatics (unadj.)				
C9-C10 Aromatics (unadj.)				
C9-C12 Aliphatics				
C9-C12 Aliphatics (unadj.)				
EPH (mg/Kg)				
2-Methylnaphthalene	10000			
Acenaphthene	10000			
Benzo(ghi)perylene	10000			
Fluoranthene	10000			
Fluorene	10000			
Naphthalene	10000	**0.8**		

Table 2-5
Detected Analytes in Soil
Site 04 - PDA

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

param_name	RIDEM I/C DEC (mg/kg)	RIDEM GA LC (mg/kg)	SS-19 RI22-SSS1901 5/11/2007 1-2 ft	SS-20 RI22-SSS2000 5/11/2007 0-1 ft
Phenanthrene	10000			
Pyrene	10000			
C11-C22 Aromatics				
C11-C22 Aromatics (unadj.)				
C19-C36 Aliphatics				
C9-C18 Aliphatics				
TPH (calculated) (mg/kg)	**2500**	**500**		**1.92**

Table 2-5
Detected Analytes in Soil
Site 04 - PDA

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

NOTES:

Bold value indicates detection of the analyte

Concentration Exceeds RIDEM GA LC

Concentration Exceeds RIDEM I/C DEC and GA LC

Total Petroleum Hydrocarbons (calculated) results were calculated for 1) MADEP Methods by summing the detected results of C5-C8 Aliphatics (unadj.), C9-C10 Aromatics (unadj.), C9-C12 Aliphatics (unadj.), C11-C22 Aromatics (unadj.), C19-C36 Aliphatics, and C9-C18 Aliphatics, and 2) GRO-DRO results by summing the GRO and DRO values

ft - feet (below ground surface)

GA - GA classified aquifer

I/C DEC - Industrial/Commercial Direct Exposure Criteria

J - result is estimated

LC - leachability criteria

RIDEM - Rhode Island Dept. of Environmental Management

MG/KG - milligrams per kilogram

MG/L - milligrams per liter

TPH - total petroleum hydrocarbons

U - not detected

Table 2-6
Detected Analytes in Groundwater
Site 04 - PDA

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

Analyte	RIDEM GA GO (mg/L)	SS-01 RI22-GWS0101 1/19/2006 1-4 ft	SS-02 RI22-GWS0201 1/18/2006 1-4 ft	SS-03 RI22-GWS0301 1/18/2006 0.3-4 ft	SS-04 RI22-GWS0401 1/19/2006 2-4 ft	SS-05 RI22-GWS0501 1/19/2006 0.6-4 ft	SS-06 RI22-GWS0601 1/19/2006 1.8-4 ft	SS-07 RI22-GWS0701 1/19/2006 0.4-4 ft	SS-08 RI22-GWS0801 1/20/2006 3.5-4 ft	SS-09 RI22-GWS0901 1/26/2006 2-12 ft	SS-10 RI22-GWS1001 1/26/2006 1-4 ft
Volatile Organics (mg/L)											
1,1-Dichloroethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	**0.000403 J**	0.001 U	**0.0204**	**0.00382**	**0.000846 J**
1,2,4-Trimethylbenzene		**0.0562**	0.00184	**0.0972**	**0.0519**	**0.241**	**0.394**	**0.109**	**0.533**	**0.27**	**0.352**
1,2-Dichlorobenzene	0.6	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.000187 J	0.001 U	0.001 U
1,2-Dichloroethane	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.000396 J	0.001 U
1,3,5-Trimethylbenzene		**0.0221**	0.001 U	**0.0258**	**0.0163**	**0.137**	**0.112**	**0.0535**	**0.149**	**0.124**	**0.196**
1,3-Dichloropropane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
2-Butanone		**0.00393 J**	0.01 U	0.01 U	0.01 U	0.01 U	**0.0049 J**	0.01 U	0.0081 J	R	**0.00702 J**
4-iso-Propyltoluene		0.00318	0.001 U	**0.00428**	**0.00133**	**0.017**	**0.00823**	**0.00801**	**0.0129**	**0.0139**	**0.0223**
Acetone		**0.0174 J**	R	R	0.00967 J	**0.00449 J**	**0.0174 J**	**0.0082 J**	0.0311 J	0.0145 J	**0.0363 J**
Benzene	**0.005**	**0.00541**	0.001 U	0.001 U	**0.00115**	**0.000398 J**	**0.0049**	**0.000144 J**	**0.00821**	**0.00491**	**0.0013**
Chlorobenzene	0.1	0.001 U	0.001 U	0.001 U	0.001 U	**0.000161 J**	**0.00026 J**	0.001 U	0.001 U	0.001 U	0.001 U
Chloroethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	**0.000692 J**	0.001 U	**0.0173**	**0.00212**	**0.00175**
Cis-1,2-Dichloroethene	0.07	**0.000332 J**	0.001 U	0.001 U	0.001 U	**0.000593 J**	**0.00151**	**0.00109**	**0.00514**	**0.00183**	**0.00163**
Ethyl benzene	0.7	**0.0262**	0.001 U	**0.00074 J**	0.000807 J	**0.00161**	**0.00175**	**0.000778 J**	**0.103**	**0.0104**	**0.00942**
Isopropylbenzene		**0.00288**	0.001 U	**0.00249**	**0.00409**	**0.015**	**0.0127**	**0.00287**	**0.0243**	**0.0094**	**0.00999**
Naphthalene	**0.02**	**0.031**	0.001 U	**0.0028**	0.001 U	**0.00866**	**0.0023**	**0.0225**	**0.159**	**0.0607**	**0.104**
n-Butylbenzene		**0.00343**	0.001 U	**0.00498**	0.000728 J	**0.0144**	**0.00543**	**0.0116**	**0.0192**	**0.019**	**0.0306**
o-Xylene		**0.0213**	0.001 U	**0.00186**	0.001 U	**0.0217**	**0.00391**	**0.00254**	**0.161**	**0.025**	**0.0301**
Propylbenzene		**0.00558**	0.001 U	**0.00672**	**0.00441**	**0.0329**	**0.0183**	**0.00778**	**0.0476**	**0.0237**	**0.0238**
p-Xylene											
sec-Butylbenzene		**0.00124**	0.001 U	**0.00274**	**0.0012**	**0.00911**	**0.00433**	**0.00308**	**0.00772**	**0.00616**	**0.0084**
t-Butyl alcohol		0.1 U	0.0582 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 UJ	0.1 UJ
tert-Butylbenzene		0.001 U	0.001 U	0.001 U	0.000558 J	**0.00216**	**0.00138**	**0.00101**	**0.00192**	**0.00212**	**0.00387**
Toluene	1	**0.00414**	0.001 U	0.001 U	0.001 U	**0.00124**	0.000991 J	**0.000566 J**	**0.127**	**0.015**	**0.00611**
trans-1,2-Dichloroethene	0.1	**0.000366 J**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.000732 J	0.001 U	0.001 U
Vinyl chloride	0.002	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.000252 J	0.001 U	**0.00142**	0.001 U	0.001 U
Xylene, m/p		**0.0721**	0.001 U	**0.00346**	0.0013	**0.00666**	**0.00902**	**0.00373**	**0.344**	**0.0408**	**0.0359**
Xylenes, Total	10										
Metals, Total (mg/L)											
Lead	**0.015**	**2.26**	**0.194**	**0.335**	**1.27**	**1.18**	**0.824**	**1.05**	**0.176**	**0.142 J**	**0.924 J**
Metals, Dissolved (mg/L)											
Lead	**0.015**	**0.00682**	**0.00276**	**0.0585**	**0.00468**	**0.0171**	**0.116**	**0.00339**	**0.00807**	**0.00874**	**0.00817 J**

Table 2-6
Detected Analytes in Groundwater
Site 04 - PDA

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

Analyte	RIDEM GA GO (mg/L)	GP-01 RI 22 GPS 0101 5/8/2007 2.5-7.5 ft	GP-02 RI 22 GPS 0201 5/8/2007 3.7-7.7 ft	GP-05 RI 22 GPS 0501 5/8/2007 4-8 ft	GP-06 RI 22 GPS 0601 5/8/2007 3.6-7.2 ft	GP-01 RI22-GPS0114 5/17/2007 14-16 ft	GP-02 RI22-GPS0214 5/17/2007 14-16 ft	GP-03 RI22-GPS0301 5/9/2007 3.1-5 ft	GP-04 RI22-GPS0401 5/9/2007 5.7-7.2 ft	GP-07 RI22-GPS0701 5/9/2007 4.5-8.7 ft	MW-1 RI22-GWSMW101 1/27/2006 10-20 ft
Volatile Organics (mg/L)											
1,1-Dichloroethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2,4-Trimethylbenzene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	**0.0356**	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichlorobenzene	0.6	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichloroethane	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,3,5-Trimethylbenzene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	**0.0089**	0.001 U	0.001 U	0.001 U	0.001 U
1,3-Dichloropropane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
2-Butanone		R	R	R	R	R	R	R	R	R	R
4-iso-Propyltoluene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Acetone		R	R	R	R	R	R	R	R	R	R
Benzene	**0.005**	**0.0019**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chlorobenzene	0.1	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chloroethane		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.001 U
Cis-1,2-Dichloroethene	0.07	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Ethyl benzene	0.7	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	**0.0083**	0.001 U	0.001 U	0.001 U	0.001 U
Isopropylbenzene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	**0.001**	0.001 U	0.001 U	0.001 U	0.001 U
Naphthalene	**0.02**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	**0.0266**	0.001 U	0.001 U	0.001 U	0.001 U
n-Butylbenzene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
o-Xylene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	**0.0129**	0.001 U	0.001 U	0.001 U	0.001 U
Propylbenzene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	**0.0041**	0.001 U	0.001 U	0.001 U	0.001 U
p-Xylene											
sec-Butylbenzene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	**0.0017**	0.001 U	0.001 U	0.001 U	0.001 U
t-Butyl alcohol											0.1 UJ
tert-Butylbenzene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Toluene	1	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	**0.0179**	0.001 U	0.001 U	0.001 U	0.001 U
trans-1,2-Dichloroethene	0.1	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Vinyl chloride	0.002	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Xylene, m/p		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	**0.0302**	0.002 U	0.002 U	0.002 U	0.001 U
Xylenes, Total	10	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	**0.0431**	0.003 U	0.003 U	0.003 U	
Metals, Total (mg/L)											
Lead	**0.015**		0.01 U	**0.018**	0.01 U			**0.011**	**0.024**	**0.014**	**0.000429 J**
Metals, Dissolved (mg/L)											
Lead	**0.015**	0.01 U	0.01 U	0.01 U	0.01 U			0.01 U	0.01 U	0.01 U	0.001 U

Table 2-6
Detected Analytes in Groundwater
Site 04 - PDA

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

Analyte	RIDEM GA GO (mg/L)	MW-1 RI22-GWSMW102 6/26/2007 6-16 ft	MW-2 RI22-GWSMW201 1/30/2006 6-16 ft	MW-2 RI22-GWSMW202 6/26/2007 6-16 ft	MW-8 RI22-GWSMW801 1/30/2006 6-16 ft	MW-8 RI22-GWSMW802 6/27/2007 6-16 ft	MW-14 RI22-GWSMW1401 1/30/2006 2-12 ft	MW-14 RI22-GWSMW1402 6/27/2007 2-12 ft	MW-14D RI22-MWS14D01 5/18/2007 10-20 ft	MW-14D RI23-GWSMW14D02 6/26/2007 10-20 ft
Volatile Organics (mg/L)										
1,1-Dichloroethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2,4-Trimethylbenzene		0.001 U	0.001 U	0.001 U	**0.00124**	**0.0016**	**0.0326**	**0.0034**	**0.0616**	**0.0035**
1,2-Dichlorobenzene	0.6	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichloroethane	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 UJ	0.001 U	0.001 U
1,3,5-Trimethylbenzene		0.001 U	0.001 U	0.001 U	0.001 U	**0.0018**	**0.0101**	**0.004**	**0.0141**	**0.0047**
1,3-Dichloropropane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	**0.001**	0.001 U	0.001 U
2-Butanone		R	R	R	R	R	R	R	R	R
4-iso-Propyltoluene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	**0.00118**	0.001 U	0.001 U	0.001 U
Acetone		R	0.00331 J	R	**0.00432 J**	R	**0.00318 J**	R	R	R
Benzene	**0.005**	0.001 U	0.001 U	0.001 U	**0.318**	**0.531**	**0.02**	**0.202**	**0.756**	**0.289**
Chlorobenzene	0.1	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chloroethane		0.002 U	0.001 U	0.002 U	0.001 U	0.002 U	0.001 U	0.002 U	0.002 U	0.002 U
Cis-1,2-Dichloroethene	0.07	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Ethyl benzene	0.7	0.001 U	0.001 U	0.001 U	**0.00774**	**0.0265**	**0.0162**	**0.0746**	0.143	**0.0848**
Isopropylbenzene		0.001 U	0.001 U	0.001 U	**0.000447 J**	**0.0018**	**0.00209**	**0.004**	**0.0055**	**0.0047**
Naphthalene	**0.02**	0.001 U	0.001 U	0.001 U	**0.00104**	**0.0042**	**0.0162**	**0.0046**	**0.0152**	**0.0312**
n-Butylbenzene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	**0.00233**	0.001 U	0.001 U	0.001 U
o-Xylene		0.001 U	0.001 U	0.001 U	**0.00194**	**0.009**	**0.00947**	**0.0175**	**0.0132**	**0.017**
Propylbenzene		0.001 U	0.001 U	0.001 U	**0.000586 J**	**0.0033**	**0.00382**	**0.0107**	**0.0142**	**0.013**
p-Xylene		0.002 U		0.002 U		**0.0695**		**0.0785**		**0.0739**
sec-Butylbenzene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	**0.00158**	0.001 U	0.001 U	0.001 U
t-Butyl alcohol			0.1 UJ		0.1 UJ		0.1 UJ			
tert-Butylbenzene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	**0.000305 J**	0.001 U	0.001 U	0.001 U
Toluene	1	0.001 U	0.001 U	0.001 U	**0.00283**	**0.0159**	**0.000927 J**	**0.0958**	**0.0562**	0.132
trans-1,2-Dichloroethene	0.1	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Vinyl chloride	0.002	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Xylene, m/p			0.001 U		**0.00776**		**0.0391**		0.343	
Xylenes, Total	10	0.003 U		0.003 U		**0.0785**		**0.096**	**0.356**	**0.0909**
Metals, Total (mg/L)										
Lead	**0.015**		**0.0059 J**		**0.00201 J**		**0.0173 J**			
Metals, Dissolved (mg/L)										
Lead	**0.015**		**0.000397 J**		0.001 U		0.001 U			

Table 2-6
Detected Analytes in Groundwater
Site 04 - PDA

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

Analyte	RIDEM GA GO (mg/L)	MW-15 RI22-GWSMW1501 1/30/2006 2-12 ft	MW-15 RI23-GWSMW1502 6/26/2007 2-12 ft	MW-15D RI23-GWSMW15D02 6/25/2007 10.2-15.2 ft	MW-20 RI22-GWSM2002 6/26/2007 2-12 ft	MW-20D RI22-MWS20D01 5/31/2007 10-20 ft	MW-20D RI23-GWSMW20D02 6/26/2007 10-20 ft	MW-21 RI22-GWSMW2102 6/26/2007 2-12 ft	MW-21D RI23-GWSMW21D02 6/26/2007 12.5-17.5 ft	MW-22 RI23-GWSMW2202 6/27/2007 2-12 ft
Volatile Organics (mg/L)										
1,1-Dichloroethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2,4-Trimethylbenzene		**0.00974**	**0.0017**	**0.0315**	0.001 U	0.001 U	0.001 U	0.001 U	**0.0032**	0.001 U
1,2-Dichlorobenzene	0.6	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichloroethane	0.005	0.001 U	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 U
1,3,5-Trimethylbenzene		**0.00392**	0.001 U	**0.0093**	0.001 U	0.001 U	0.001 U	**0.0031**	**0.0062**	0.001 U
1,3-Dichloropropane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
2-Butanone		R	R	R	R	R	R	R	R	R
4-iso-Propyltoluene		**0.000667 J**	0.001 U	**0.0029**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Acetone		**0.00328 J**	R	R	R	R	R	R	R	R
Benzene	**0.005**	0.001 U	**0.004**	0.38	0.001 U	0.001 U	**0.0127**	**0.0256**	**0.0954**	**0.0012**
Chlorobenzene	0.1	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chloroethane		0.001 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Cis-1,2-Dichloroethene	0.07	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Ethyl benzene	0.7	**0.00189**	**0.0016**	0.102	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Isopropylbenzene		**0.000656 J**	0.001 U	**0.0093**	0.001 U	0.001 U	0.001 U	**0.0031**	**0.0062**	0.001 U
Naphthalene	**0.02**	**0.00182**	0.001 U	**0.0304**	0.001 U	0.001 U	0.001 UJ	0.001 U	**0.0014**	0.001 U
n-Butylbenzene		**0.00123**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	**0.0018**	0.001 U
o-Xylene		**0.00206**	**0.0019**	**0.0845**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Propylbenzene		**0.00154**	**0.001**	**0.0189**	0.001 U	0.001 U	0.001 U	**0.0025**	**0.008**	0.001 U
p-Xylene			**0.0036**	**0.132**	0.002 U	0.002 U	0.002 U	0.002 U	**0.0038**	0.002 U
sec-Butylbenzene		**0.000482 J**	0.001 U	**0.0026**	0.001 U	0.001 U	0.001 U	**0.002**	**0.0027**	0.001 U
t-Butyl alcohol		0.1 UJ								
tert-Butylbenzene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Toluene	1	**0.000368 J**	0.001 U	0.0805	0.001 U	0.001 U	0.001 U	0.001 U	**0.0018**	0.001 U
trans-1,2-Dichloroethene	0.1	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Vinyl chloride	0.002	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Xylene, m/p		**0.00618**								
Xylenes, Total	10		**0.0055**	**0.216**	0.003 U	0.003 U	0.003 U	0.003 U	**0.0038**	0.003 U
Metals, Total (mg/L)										
Lead	**0.015**	**0.151 J**								
Metals, Dissolved (mg/L)										
Lead	**0.015**	**0.0201**								

Table 2-6
Detected Analytes in Groundwater
Site 04 - PDA

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

Analyte	RIDEM GA GO (mg/L)	MW-22D RI23-GWSMW22D02 6/27/2007 12-17 ft
Volatile Organics (mg/L)		
1,1-Dichloroethane		0.001 U
1,2,4-Trimethylbenzene		0.001 U
1,2-Dichlorobenzene	0.6	0.001 U
1,2-Dichloroethane	0.005	0.001 U
1,3,5-Trimethylbenzene		0.001 U
1,3-Dichloropropane		0.001 U
2-Butanone		R
4-iso-Propyltoluene		0.001 U
Acetone		R
Benzene	**0.005**	0.001 U
Chlorobenzene	0.1	0.001 U
Chloroethane		0.002 U
Cis-1,2-Dichloroethene	0.07	0.001 U
Ethyl benzene	0.7	0.001 U
Isopropylbenzene		0.001 U
Naphthalene	**0.02**	0.001 U
n-Butylbenzene		0.001 U
o-Xylene		0.001 U
Propylbenzene		0.001 U
p-Xylene		0.002 U
sec-Butylbenzene		0.001 U
t-Butyl alcohol		
tert-Butylbenzene		0.001 U
Toluene	1	0.001 U
trans-1,2-Dichloroethene	0.1	0.001 U
Vinyl chloride	0.002	0.001 U
Xylene, m/p		
Xylenes, Total	10	0.003 U
Metals, Total (mg/L)		
Lead	**0.015**	
Metals, Dissolved (mg/L)		
Lead	**0.015**	

NOTES:
Bold value indicates detection of the analyte
Concentration Exceeds RIDEM GA GO
ft - feet (below ground surface)
GA - GA classified aquifer
GO - Groundwater Objectives
J - result is estimated
MG/L - milligrams per liter
R - rejected result
RIDEM - Rhode Island Dept. of Environmental Management
U - not detected

Section 3.0 Baseline Risk Assessment

This Baseline Risk Assessment for Site 04 - PDA, at the AMSA 68 (G) has been preformed in accordance with CERCLA, the NCP, and applicable USEPA guidance. Section 3.1 presents the Human Health Risk Assessment (HHRA) and Section 3.2 provides an Ecological Risk Evaluation.

3.1 Human Health Risk Assessment

This section provides the technical approach and results for the Human Health Risk Assessment (HHRA) performed in support of the RI for Site 04. The purpose of the risk assessment is to quantify the human health risks associated with potential exposures to site-related constituents under current and reasonably foreseeable future land use conditions, in the absence of any remedial actions.

The applicable legal requirement for the HHRA is CERCLA, as amended. The applicable regulatory requirement is the NCP, 40 CFR Part 300. The HHRA is performed using EPA CERCLA guidance for risk assessment, including the following USEPA risk assessment guidance and directives:

- *Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual (Part A)* (RAGS) (USEPA, 1989)
- *Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors (OSWER Directive 9285.6-03.;* USEPA, 1991)
- *Guidance for Data Usability in Risk Assessments* (USEPA, 1992)
- *USEPA Region I Risk Updates, Number 2* (USEPA, 1994a)
- *USEPA Region I Risk Updates, Number 3* (USEPA, 1995a)
- *USEPA Region I Risk Updates, Number 4* (USEPA, 1996a)
- *USEPA Region I Risk Updates, Number 5* (USEPA, 1999a)
- *Exposure Factors Handbook* (USEPA, 1997)
- *Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual (Part D)* (RAGS) (USEPA, 2001)
- *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (USEPA, 2002a)
- *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites* (USEPA, 2002b)
- *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* (USEPA, 2002c)
- *Human Health Toxicity Values in Superfund Risk Assessments (OSWER No. 9285.7-53, December 2003)*
- *Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual (Part E)* (RAGS) (USEPA, 2004a)

The HHRA is organized into four sections (hazard identification, exposure assessment, toxicity assessment, and risk characterization), and includes supporting documentation for exposure point concentration and modeling calculations in **Appendix K**.

The hazard identification presents a summary of the analytical data that are used in the HHRA and the chemicals selected for evaluation in the risk assessment (i.e., the chemicals of potential concern [COPCs]). The exposure assessment provides information about the activities that may occur under the current and anticipated future land uses of the Site, the pathways by which people engaged in those activities could be exposed to COPCs at the Site, and quantifies the exposures associated with those pathways. The toxicity assessment provides information about the potential toxicity and dose-response profiles of the COPCs. The risk characterization combines the dose-response information and quantitative exposure estimates to provide quantitative estimates of risk for cancer and systemic toxic effects. In order to provide additional perspective for risk management decision-making, this section also contains an analysis of the variables that lend the greatest uncertainty and have the greatest potential effect on the quantitative risk estimates.

3.1.1 Hazard Identification

Site Description and Conceptual Site Model

The AMSA 68 (G) Facility is located in the North Central Industrial Park in Smithfield, RI. The facility comprises four acres of fenced property. Two buildings are presently located on the facility property: the Maintenance Building (main building), historically used for field maintenance repairs, direct exchange of repair parts, and automotive, engineering, and signal support; and a water pump house, historically used as a fire-suppression water delivery pump house. The Maintenance Building is still used for maintenance of military vehicles by USARC personnel.

The PDA is an inactive non-regulated disposal area along the property line north of the AMSA building (**Figure 1-3**). Site 04 is located adjacent to the Site 05 (UST) and near the Maintenance Building. The area investigated in support of the Site 04 RI is covered with grass and weeds that are occasionally mowed. The groundwater beneath Site 04 is relatively shallow (3 feet bgs), and is classified as GB by the State of Rhode Island. GB groundwater is not considered to be current or potential drinking water. The facility receives municipally-supplied potable water.

Soil and groundwater data collected by MACTEC during the RI performed in 2006 and 2007 indicate that constituents typical of gasoline releases, including BTEX, aliphatic substituted benzenes, and petroleum hydrocarbons, are present in soil and groundwater. Low levels of chlorinated VOCs (e.g.., trichloroethene) have also been detected. The majority of VOC contamination in soil is present in soil samples collected between 0 and 2 ft bgs, suggestive of an historical surficial release at Site 04. The soil VOC contamination is bounded by the perimeter soil samples SS-11, SS-17, SS-18, SS-19, which show non-detect results for VOCs, and SS-20 which shows very low levels of VOCs. Groundwater VOC contamination at Site 04 has been detected in shallow groundwater and deep groundwater. The shallow groundwater plume does not extend off of the facility property, and is bounded by clean (non-VOC impacted) downgradient sampling locations. The deep groundwater contamination appears to be a continuation of a groundwater plume from Site 05. The deeper groundwater plume at Site 04 is either overlain by the shallow groundwater plume, or by clean (non-VOC impacted) groundwater at locations outside of the extent of the shallow groundwater plume.

Collectively, the RI data indicate that petroleum-related and chlorinated constituents are present in soil and groundwater. Given the shallow nature of the groundwater, it is likely that the release to soil migrated directly into the saturated zone, where contamination spread downgradient with groundwater flow.

Under existing land use conditions, contact with surface soil would be negligible given that there are no activities that are designated to occur in grass-covered areas other than occasional lawn mowing. This

RA incorporates the assumption that industrial/commercial or military use of the Site will be maintained in the future. Under current and future land use conditions, industrial/commercial workers could contact soil while working outdoors.

Volatile chemicals in shallow groundwater can partition to soil gas, and soil gas can subsequently migrate to air within nearby or overlying enclosed buildings. This migration pathway is referred to as vapor intrusion. If the buildings are occupied, people breathing the air may be exposed to the vapors. Under current land use conditions, exposure pathways to vapors that may migrate to air within the Maintenance Building are not complete because: a) the building is not an occupied building such as an office building; it is a garage that is used only USARC duties to maintain military vehicles; and b) volatile contamination in groundwater associated with Site 05 is in closer proximity to the building and, therefore, would be more representative of the potential groundwater VOC sources to indoor air. However, if the Maintenance Building was expanded such that a portion was located over or in close proximity to Site 04, or if a new building was constructed at Site 04, the vapor intrusion pathway could be complete.

Data Evaluation

The data evaluation portion of the Hazard Identification section: a) identifies the data available for use in HHRA, and justifies the selection or exclusion of particular data for use in the risk assessment; b) provides the rationale for the way data will be grouped for evaluation in the risk assessment; and c) documents the methods used to summarize data into statistical descriptors.

Data Sources and Data Quality

The RI and Risk Assessment for Site 04 are based on the data collected in support of the RI/FS program. Data collected for the RI are selected for use in the HHRA using the criteria established by EPA in "Guidance for Data Usability in Risk Assessment" (USEPA, 1992).

The data presented in this RI and selected for use in the HHRA are a product of laboratory analyses performed in accordance with EPA methods and associated Quality Assurance/Quality Control (QA/QC) procedures, as described in the QAPP**.** Data are presented in **Appendix J**. Based on the data quality assessment (see Section 2.1.6), data are of suitable quality for use in the risk assessment.

Data Used in HHRA

Soil samples collected at Site-04 include:

- Twenty-one soil samples collected from surface soil sampling locations (SS-01 through SS-20) at the 0-1 or 1-2 ft bgs interval (location SS-06 was also sampled at the 2-3 ft bgs interval) in 2006 and 2007 in support of the MACTEC RI. As indicted in **Table 3-1**, all of these samples were analyzed for VOCs. A subset of the samples were analyzed for lead, GRO, DRO, VPH, and EPH. The GRO/DRO and EPH/VPH analyses were divided among the samples so that each sample received either GRO/DRO or EPH/VPH analyses.

The soil data are presented in **Appendix J**, the analytes detected in soil are presented in **Table 2-5**, and the soil sample locations are shown in **Figure 2-1**.

All of the soil data are used in the HHRA, as indicated in **Table 3-1**.

Groundwater samples collected at Site-04 include:

- Nineteen groundwater samples collected by direct push methods from surface soil sample locations. Ten of the samples were collected in 2006 and nine of the samples were collected in 2007;
- Twenty-one groundwater samples collected from monitoring wells in 2006 and/or 2007;
- All samples were analyzed for VOCs and a subset of samples were analyzed for total and filtered metals, as indicated in **Table 3-1**.

The groundwater data from the investigation are presented in **Appendix J**, the analytes detected in groundwater are presented in **Table 2-6**, and the groundwater sample locations are shown in **Figures 2-2 and 2-3**.

The only potential exposure pathway to chemicals in groundwater is via vapor migration to indoor air (vapor intrusion). A discussed in Section 2.2.3, the groundwater data indicate that the groundwater VOC contamination associated with the release(s) at Site 04 is confined to the upper 12 feet of the aquifer. VOC contamination in the shallow groundwater represents a potential source of vapor intrusion. VOC contamination that is located deeper in the aquifer (beneath the shallow VOC groundwater contamination), or that is overlain by clean groundwater (non-VOC impacted groundwater), is not a potential source of vapors that may migrate to indoor air. Therefore, the groundwater data used in the HHRA are for samples that were collected from direct push intervals with a bottom depth 12 ft bgs or shallower, and from monitoring wells with a bottom depth of the screened interval that is 12 ft bgs or shallower. The samples used for the HHRA are listed in **Table 3-1**.

Data Summarization

The ultimate product of data evaluation and data summarization is a set of analytical data in a form that can be used in the quantitative risk assessment. Each data set developed for the risk assessment is summarized so as to provide the following statistical descriptors:

- The ratio of the number of samples in which the constituent is detected to the total number of samples (i.e., frequency of detection);
- Range of analytical quantitation limits;
- Range of detected concentrations;
- Data qualifiers associated with the minimum and maximum detected concentrations;
- Sample identifier associated with the maximum detected concentration; and
- Arithmetic mean concentration.

A data summary for soil is provided in **Table 3-2** and a summary for groundwater is presented in **Table 3-3**. The following procedures were applied when summarizing the analytical data for the HHRA:

- For samples in which a field duplicate was collected, both of the analytical results were used in the risk assessment.
- Rejected data ("R" qualified results) were not used in the risk assessment.
- Results qualified as estimated ("J" qualified) were used in the risk assessment.
- For samples in which analyte concentrations are detected outside the calibration range, and the samples are diluted and reanalyzed, only the re-analysis results were used in the risk assessment.

- Arithmetic mean concentrations were calculated as the mean of detected concentrations, consistent with current USEPA guidance (USEPA, 2007).

Chemicals of Potential Concern

COPCs are chemicals that may pose more than a *de minimis* health risk. A concentration-toxicity screening is used to reduce the number of chemicals evaluated in the risk assessment to only those that would potentially pose more than a *de minimis* health risk (USEPA, 1994). The procedure used to select COPCs for the HHRA is summarized as follows, and is consistent with USEPA methodology:

A. Comparison to Available Criteria

- Selected as a COPC in soil if the maximum detected concentration exceeds the USEPA Region IX PRG for residential soils (USEPA, 2004b).

- Selected as a COPC in groundwater if the maximum detected concentration exceeds the USEPA shallow groundwater target concentration for vapor intrusion (USEPA, 2002c).

The PRGs are protective for direct contact (ingestion and dermal contact) exposures, as well as for inhalation of constituents that may be released to air. The PRGs are derived for a 1 in 1 million ($1x10^{-6}$) cancer risk level or a non-cancer hazard quotient (HQ) of 1. Per USEPA Region 1 guidance (USEPA, 1999), the PRGs based on non-carcinogenic effects are adjusted to represent a HQ of 0.1 for the purposes of COPC selection. The use of residential soil PRGs to select COPCs in soil represents a conservative approach since the Site is presently, and will continue to be, used only for non-residential purposes.

The USEPA vapor intrusion guidance (USEPA, 2002c) provides a tiered approach for evaluating the vapor intrusion exposure pathway. The first tier of analysis involves identifying VOCs that are of sufficient toxicity and volatility to represent a potential vapor intrusion concern, and determining if the VOC source area could pose a potential vapor intrusion source. The conceptual model for the Site considers the possibility that buildings could be constructed at Site 04 in the future, thereby resulting in the shallow groundwater VOC plume being a potential VOC source for vapor intrusion. The vapor intrusion screening values published by USEPA (2002c) may be used with analytical data to determine if VOCs are present at concentrations that could pose a potential vapor intrusion concern. Use of the vapor intrusion screening values for the groundwater COPC selection completes the first tier of vapor intrusion screening. The USEPA vapor intrusion screening values (USEPA, 2002c) represent groundwater concentrations that are protective for migration of vapors from groundwater to air within a residential house with a basement. The screening values presented in **Table 3-3** are derived for a 1 in 1 million ($1x10^{-6}$) cancer risk level or a non-cancer HQ of 0.1. These screening values may be used to identify VOCs that could present a potential vapor intrusion concern and, therefore, require additional evaluation. Application of these values to select COPCs in groundwater is conservative because the Site is presently, and will continue to be, used only for non-residential purposes.

B. Low Frequency of Detection:

- Despite other criteria, an analyte is not selected as a COPC if the frequency of detection is 5 percent or less and the chemical is not known to be associated with historical operations at the Site (USEPA, 1989).

The results of the COPC selection for soil and groundwater are provided in Tables 3-1 and 3-2. The following notes are used to denote the reasons for selection or exclusion of analytes as COPCs:

ASL: The concentration used for COPC screening (the maximum detected concentration) is greater than the risk-based PRG; the analyte is therefore selected as a COPC.

BSL: The concentration used for COPC screening (the maximum detected concentration) is less than the risk-based PRG; the analyte is therefore not selected as a COPC.

NSL: There is no screening value available; the analyte is therefore selected as a COPC.

FOD: The frequency of detection is below 5%; the analyte is therefore not selected as a COPC.

NV: The analyte is not considered to be sufficiently volatile to pose a potential vapor intrusion concern (USPEA, 2002c).

In soil (**Table 3-2**), 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 4-iso-propyltoluene, naphthalene, 2-methylnaphthalene, xylenes, and petroleum hydrocarbons (DRO, GRO, VPH fractions, and EPH fractions) were retained as COPCs. The petroleum fractions and 4-iso-propyltoluene were retained as COPCs because no screening values are available. All other chemicals were retained as COPCs because they were detected at maximum concentrations in excess of the PRG values.

In groundwater (**Table 3-3**), 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 4-iso-propyltoluene, benzene, isopropylbenzene, naphthalene, butylbenzene, and propylbenzene were retained as COPCs. 4-Iso-propyltoluene was retained as a COPC because no screening value is available. All other chemicals were retained as COPCs because they were detected at maximum concentrations in excess of the vapor intrusion screening values.

3.1.2 Exposure Assessment

The exposure assessment is conducted to evaluate the populations of humans that may potentially occur at the site, the mechanisms or exposure pathways by which those humans may be potentially exposed to contamination at the site, and the magnitude of exposure that may occur through the potential exposure pathways. This process involves three steps:

1) Characterization of the exposure setting in terms of physical characteristics, current and future uses of the site, and the populations that may be potentially exposed to COPCs under the current and future land uses;

2) Identification of potential exposure pathways and exposure points to which the populations may be exposed; and

3) Quantification of exposure to COPCs for each potentially complete pathway and exposure point.

Characterization of Exposure Setting and Potentially Exposed Populations

The AMSA 68 (G) site consists of the Maintenance Building, and surrounding paved and mowed grass areas. Site 04 is located to the north of the Maintenance Building along the property boundary. Under the current land use conditions, the facility is used by the USARC for military vehicle maintenance. Since Site 04 is located within a fenced military installation, it is unlikely that trespassers would gain access to, or spend time at, the Site. Therefore, under current land use conditions, only military personnel are expected to be present at the Site.

The future use of the facility is not expected to change. Therefore, it is unlikely that persons other than facility personnel would access the Site. However, the risk assessment incorporates the assumption that

the Site could become actively used for industrial/commercial purposes, and that access by facility personnel or industrial/commercial workers could occur frequently and for prolonged periods.

The risk assessment incorporates the assumption that the Site will not be used for purposes other than industrial/commercial in the future. Therefore, under future use conditions, military personnel and/or industrial/commercial workers could be present at the Site.

Groundwater beneath the Site is classified as GB by the State of Rhode Island. Groundwater flows north from Site 04 toward the property boundary. GB groundwater is not considered to be a source of potable water; potable water is supplied to the facility by the Town of Smithfield. GB groundwater is considered by the State of Rhode Island to be a potential source of vapors to indoor air. The adjacent downgradient property (north of Albion Road) overlies GA groundwater. GA groundwater is considered to be a potential potable water resource.

Exposure Pathways and Exposure Points

Based on the current and future land use information, the following exposure pathways to soil may be potentially complete and, therefore, are evaluated in the risk assessment. **Table 3-4** provides a summary of the potentially complete exposure pathways.

The majority of the soil samples collected at the Site are from locations in an unpaved grass and weed covered area. Facility personnel may be exposed to soil during lawn mowing or other similar activities.

Exposure to the constituents in soil can occur through dermal contact with the soil (e.g., placing hands on the soil or when soil-derived dust becomes adhered to skin following active work on the soil), incidental ingestion of soil (e.g., through hand-mouth activity), and through inhalation of soil-derived dust (e.g., wind erosion or excavation of unvegetated soil) or vapors emitted from volatile constituents in the soil.

The only potentially complete exposure pathway to groundwater is via migration of vapors to indoor air, if a building is constructed at or in close proximity to Site 04 in the future. Industrial/commercial workers in such a building could be exposed to VOCs by inhalation of indoor air while occupying the building.

Under current land use conditions, the exposure pathways that may be complete include:

- Soil: Incidental ingestion, dermal contact, and dust and ambient vapor inhalation to constituents in unpaved soil by facility personnel.

Under future land use conditions, the exposure pathways that may be complete include:

- Soil: Incidental ingestion, dermal contact, and dust and ambient vapor inhalation to constituents in soil by industrial/commercial workers working at the facility.
- Groundwater: Inhalation of vapors that may migrate from groundwater to indoor air.

The soil exposure point evaluated in this HHRA is surface soil (soil 0-2 ft bgs, plus the 2-3 ft bgs samples collected at SS-06). All soil samples collected at Site 04 (**Table 3-1**) are included in the exposure point except locations SS-11, SS-16, SS-17, and SS-18, which are clean perimeter samples (i.e., no VOCs or petroleum detected) and are therefore excluded from the soil exposure point.

The groundwater exposure point evaluated in this HHRA is shallow groundwater associated with Site 04 (samples listed in **Table 3-1**). The downgradient groundwater samples that exhibit no detected VOCs are not included in the groundwater exposure point (**Table 3-1**).

Exposure Scenarios

Exposure scenarios are used to quantitatively describe the COPC exposures that could theoretically occur for each land use and exposure pathway evaluated. The exposure scenarios are used in conjunction with exposure point concentrations (EPCs) to derive quantitative estimates of COPC intake. The ultimate goal of developing exposure scenarios, as defined in USEPA guidance, is to identify the combination of exposure parameters that results in the most intense level of exposure that may "reasonably" be expected to occur under the current and future site conditions (USEPA, 1989). Therefore, one exposure scenario is often selected to provide a conservative evaluation for the range of possible receptors and populations that could be exposed at the site. The resulting exposure scenarios are referred to as the Reasonable Maximum Exposure (RME) for each exposure pathway.

To characterize potential exposures and risks associated with soil and vapor intrusion from groundwater at this Site, a full-time industrial/commercial worker scenario is used. Although current and anticipated use of the property is by military personnel as opposed to industrial/commercial workers, the industrial/commercial worker scenario simulates potential contact with soil or building occupancy that would occur to someone who accessed or worked at the Site full-time over a long duration, and is therefore protective for military personnel who may have more limited contact with the soil or who may be in buildings only part-time.

The risk assessment considers the potential for frequent exposures to soil and indoor air by adult workers under future land use conditions. The industrial/commercial worker scenario is evaluated in this risk assessment to represent potential exposures under current and future land use conditions.

The industrial/commercial worker scenario for soil is evaluated using USEPA default exposure parameters for outdoor industrial/commercial workers (USEPA, 2002a). The industrial/commercial worker scenario for groundwater is evaluated using USEPA default exposure parameters for indoor workers (USEPA, 2002a). The exposure parameters and intake algorithms are provided in **Table 3-5** (soil) and **Table 3-6** (groundwater), and are based on an exposure to Site media 8 hours per day, 225 days per year, for 25 years.

Exposure Point Concentrations

In accordance with USEPA guidance, RME EPCs are typically based on the lesser of the 95 percent upper confidence limit (UCL) on the arithmetic mean of the concentration, or the maximum detected concentration in the data set, for each exposure point (USEPA, 1995). The 95 percent UCL values are calculated using the ProUCL software (V. 4.0; USEPA, 2007). The ProUCL software tests the distribution of the data set for which the EPC is being derived (e.g., normal, lognormal, gamma, non-parametric), and then calculates a conservative and stable UCL value in accordance with the framework described in “Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites” (USEPA, 2002b). UCL calculations for soil are documented in **Appendix K**. EPCs for soil are presented in **Table 3-7**.

The EPCs for ambient vapors that may result from migration of VOCs from soil, and for dust that may be liberated from the soil, are calculated using the soil EPCs (**Table 3-7**) with fate and transport models. The vapor and dust emission from soil to ambient (outdoor) air was estimated using the Jury Model (as presented in USEPA, 1996). Modeling calculations are presented in **Appendix K**. The dust emissions are

characterized using a particulate emission factor, and the vapor emissions are characterized using a volatilization factor.

The soil-to-air volatilization defines the relationship between concentrations of COCs in soil and concentrations of COCs in air. The model is based on the premise that volatile COCs vaporize from soil to soil gas, then migrate through soil pore space and diffuse into the open atmosphere where receptors breathing the air might be located. Inputs to the model include factors that control the flux of the chemical (e.g., soil characteristics such as density and porosity, and chemical-specific characteristics such as Henry's Law constant), and a dispersion factor that accounts for the soil source size and meteorological conditions at the site. Soil parameters used in the model were USEPA (2004b) default parameters for type 'SL' soils, as used for the vapor intrusion modeling (described below).

Indoor air EPCs were estimated from the groundwater EPCs using the Johnson-Ettinger model, as adapted by USEPA. This model is widely accepted as a screening-level model for estimating vapor intrusion into buildings, and has been adopted by USEPA for establishing vapor intrusion screening levels in groundwater and soil gas (USEPA, 2002c). The model is based on the premise that volatile COPCs partition from groundwater to soil gas, then migrate through soil pore space and are drawn through cracks in a foundation or building slab into the air within an overlying building, where receptors breathing the air might be located. The model used in this HHRA is the Groundwater Advanced Model (v. 3.1) published by USEPA (USEPA, 2004b). The groundwater model uses measured groundwater COPC concentrations with soil characteristics (e.g., porosity), chemical-specific parameters (e.g., Henry's Law constant), and building-specific parameters (e.g., building ventilation rate), to provide an estimate of indoor air concentrations.

Modeling was performed assuming that a slab-on-grade commercial or industrial building is constructed at the Site. The groundwater source concentrations used in the modeling were the groundwater maximum detected concentration of the volatile COPCs. This represents a conservative approach, since the groundwater VOC source to indoor air would be the VOC groundwater contamination beneath and in close proximity to the entire building footprint; this is most appropriately represented by average concentrations. Use of the maximum detected concentration as the groundwater VOC source concentration results in a modeling assumption that the VOC concentrations in groundwater beneath the entire building footprint are represented by the maximum detected concentrations, and is therefore protective for placement of a building anywhere at Site 04. The following Site-specific input parameters to the model were used; all other input parameters are the USEPA default values:

- Depth of groundwater: 3 ft bgs (90 cm)
- Soil type: Loamy Sand (type "LS")
- Indoor ceiling height: 8 feet (244 cm) (assumes office space ceiling height)
- Duration of exposure: 25 years (based on RME duration for industrial/commercial workers)

Groundwater and indoor air EPCs are presented in **Table 3-8**.

Calculation of Intakes

COPC intakes via the ingestion, dermal contact, and inhalation exposure routes are calculated using the exposure parameters and EPCs identified previously. The quantified intakes for these exposure routes are combined with the appropriate dose-response data to quantify risks, as discussed in Section 3.1.4.

The equations used to calculate intake are those presented in USEPA guidance (USEPA, 1989; 2004a), and are shown in **Table 3-5**.

Ingestion

The general equation for calculating chemical intake via ingestion is as follows:

$$Intake = \frac{CS \times IR \times FI \times EF \times ED \times CF}{BW \times AT}$$

where:

Intake	=	average daily dose of COPC received over the averaging period (mg chemical/kg body weight-day),
CS	=	concentration of the COPC at the exposure point to which the receptor of interest is exposed (i.e., the EPC) (milligrams per kilogram [mg/kg]; mg/L),
IR	=	ingestion rate for the medium of concern (mg/day; L/day),
FI	=	fraction ingested (unitless),
EF	=	exposure frequency representing the number of exposure events during each year of exposure (days/year),
ED	=	exposure duration representing the period of time over which exposure may occur (years),
CF	=	appropriate units conversion factor (e.g., kg/mg)
BW	=	body weight of the hypothetically exposed individual (kg)
AT	=	averaging time (for carcinogens, AT = 70 years times 365 days per year; for noncarcinogens, AT = ED times 365 days per year).

Dermal Contact

The equation for calculating chemical intake via dermal contact with soil is as follows:

$$Intake = \frac{DAevent * SA * EV * EF * ED}{BW * AT}$$

and:

$$DAevent = CS * AF * ABSd * CF$$

where:

Intake	=	average daily dose of COPC received over the averaging period (mg chemical/kg body weight-day)
DAevent	=	dose of COPC absorbed per unit skin surface area during each exposure event (mg/cm^2-event)
CS	=	concentration of the COPC at the exposure point to which the receptor of interest is exposed (i.e., the EPC) (mg/kg),
SA	=	skin surface area in contact with the soil on days exposed (cm^2)
AF	=	mass of soil adhered to the unit surface area of skin exposed each exposure event (mg/cm^2-event)
ABSd	=	absorption factor representing the fraction of COPC that may be absorbed through the skin from soil (unitless)
EF	=	exposure frequency representing the number of exposure events during each year of exposure (days/year),
EV	=	event frequency representing the number of exposure events at the exposure point each day (event/day),
ED	=	exposure duration representing the period of time over which exposure may occur (years),

CF	=	appropriate units conversion factor (e.g., kg/mg)
BW	=	body weight of the hypothetically exposed individual (kg)
AT	=	averaging time (for carcinogens, AT = 70 years times 365 days per year; for noncarcinogens, AT = ED times 365 days per year).

The dermal absorption factor (unitless) describes the amount of COPC that may be absorbed through the skin and into the blood stream (i.e., amount that may become bioavailable) following dermal exposure to soil. Among the soil COPCs at this site, dermal absorption factors are published by USEPA (USEPA, 2004a) for naphthalene and 2-methylnaphthalene (based on the value of 0.13 for PAHs).

Inhalation

The methodology for evaluating inhalation exposures differs from that used for other exposure pathways in that the toxicity values used are RfCs and unit risks (URs) instead of reference doses (RfDs) and slope factors (SFs). Because concentration and not dose is the basis for these toxicity values, body weight, and respiration rate are not directly used in calculating potential risk estimates for carcinogenic and noncarcinogenic chemicals. The general equation for calculating chemical exposure via inhalation is as follows:

$$\textit{Exposure Concentration} = \frac{CA \times ET \times EF \times ED}{CF \times AT}$$

Where:

Exposure Concentration = representative concentration of COPC in the air at the exposure point during the period of exposure (mg/m^3)

CA	=	concentration of the COPC in air (mg/m^3),
EF	=	exposure frequency (days/year),
ED	=	exposure duration (years),
ET	=	exposure time (hours/day)
CF	=	conversion factor (24 hours/day)
AT	=	averaging time (for carcinogens, AT = 70 years times 365 days per year; for non-carcinogens, AT = ED times 365 days per year).

The quantified COPC intakes for each receptor, exposure point, and exposure route quantitatively evaluated in this HHRA are presented in the risk calculations discussed in Section 3.1.4.

3.1.3 Toxicity Assessment

The objective of the toxicity assessment is to quantify the relationship between the intake, or dose, of COPCs and the likelihood that an adverse health effect may result from exposure to the COPCs. There are two major types of adverse health effects evaluated in the risk assessment: carcinogenic, and non-carcinogenic. Following USEPA guidance (USEPA, 1989), these two effects (carcinogenic and non-carcinogenic) are evaluated separately.

There are two types of dose-response values: cancer slope factor (CSF) values for carcinogens; and RfD values for non-carcinogens. For potentially carcinogenic COPCs, both types of values have been developed by USEPA because these COPCs may elicit both carcinogenic and non-carcinogenic (systemic) effects. In addition, because toxicity and/or carcinogenicity can depend on the route of exposure (i.e., oral or dermal), unique dose-response values have been developed for the oral and dermal exposure routes.

Dose-Response Values for Carcinogenic Effects

For carcinogenic effects, USEPA uses a two-part evaluation in which the substance is first assigned a weight-of-evidence classification, and then a CSF or UR is calculated to reflect the carcinogenic potency.

Group A - Human Carcinogen. This category indicates there is sufficient evidence from epidemiological studies to support a causal association between an agent and human cancer.

Group B - Probable Human Carcinogen. This category generally indicates there is at least limited evidence from epidemiologic studies of carcinogenicity to humans (Group B1) or that, in the absence of data on humans, there is sufficient evidence of carcinogenicity in animals (Group B2).

Group C - Possible Human Carcinogen. This category indicates that there is limited evidence of carcinogenicity in animals in the absence of data on humans.

Group D - Not Classified. This category indicates that the evidence for carcinogenicity in animals is inadequate.

Group E - No Evidence of Carcinogenicity to Humans. This category indicates that there is evidence of noncarcinogenicity in at least two adequate animal tests in different species or in both epidemiologic and animal studies.

In the revised Guidelines for Carcinogenic Risk Assessment (USEPA, 2003), USEPA revised the approach to describing the carcinogenic potential of an agent from an alphanumeric system to a weight-of-evidence-based descriptive narrative. "Carcinogenic to Humans", "Likely to Be Carcinogenic to Humans", "Suggestive Evidence of Carcinogenic Potential", "Data Inadequate for an Assessment of Human Carcinogenic Potential", and "Not Likely to be Carcinogenic in Humans" are example descriptors that would be accompanied by a narrative that summarizes the basis of the descriptor. Therefore, USEPA's previous alpha-numeric classifications described below are found in USEPA's Integrated Risk Information System (IRIS) database for most chemicals. In the USEPA IRIS, the weight of evidence classification for a given chemical may reflect either of the two classification schemes identified above.

CSF and UR values are typically calculated for chemicals in Groups A, B1, B2, and "Carcinogenic to humans" and "Likely to be carcinogenic to humans". Cancer dose-response values for chemicals in Group C are calculated on a case-by-case basis. The CSF is an estimate of the upper 95 percent confidence limit of the slope of the dose-response curve extrapolated to low doses.

Dose-Response Values for Non-carcinogenic Effects

In contrast to carcinogens, non-carcinogens are believed to have threshold exposure levels below which adverse effects are not expected. USEPA has derived standards and guidelines based on acceptable levels of exposure for such compounds. Non-carcinogenic effects of concern on which many of the standards and guidelines are based include liver toxicity, reproductive effects, neurotoxicity, teratogenicity, and other chronic toxicities. Various criteria have been developed from experiments that can be used to estimate the dose-response relationship of non-carcinogens. Some of the same uncertainties involved in deriving cancer risk estimates (namely, selection of an appropriate data set and extrapolation of high-dose animal data to low-dose human exposure) are also involved in deriving non-carcinogenic dose-response criteria. Dose-response values used most often to evaluate non-carcinogenic effects are RfDs.

The RfD, expressed in units of mg/kg/day, is defined as an estimate (with uncertainty spanning perhaps an order of magnitude or greater) of a daily exposure level for the human population, including sensitive

subpopulations, that is likely to be without an appreciable risk of deleterious effects during a lifetime (USEPA, 1989a). When available, the RfD is the dose-response criterion most appropriate for quantitatively estimating non-carcinogenic effects. The RfC, in units of mg/m^3, is analogous to the RfD and is developed through a similar process. However, unlike RfDs, which represent a dose (in mg/kg/day) at which adverse or deleterious effects are unlikely, RfCs represent air concentrations (in mg/m^3) at which adverse or deleterious effects are unlikely (i.e., an air concentration corresponding to a HI = 1.0). In this HHRA, inhalation RfCs are used to estimate the non-cancer risks associated with inhaling COPCs.

Adjustment for Dermal Exposure

Cancer CSFs and non-cancer RfDs were developed to evaluate risk associated with the dermal contact exposure route. In accordance with USEPA guidance (USEPA, 2004b), dermal dose-response values are calculated from oral dose-response values using an oral absorption factor. The oral absorption factor represents the amount of substance that is absorbed from the gastrointestinal tract following oral administration of a substance. The absorbed dose represents the amount of substance that is potentially available for biological interaction; it is by this dose-response relationship that the toxicity of a dermally absorbed substance must be evaluated.

Thus, for potentially carcinogenic substances, the dermal dose-response value is calculated as follows:

$$SF_d = SF_o \ / \ Oral\ ABS$$

The dermal dose-response value for evaluating noncarcinogenic effects is calculated as follows:

$$RfD_d = RfD_o \ X \ Oral\ ABS$$

Chemical-specific oral ABS values for are published by USEPA (USEPA, 2004a). In accordance with USEPA guidance (USEPA, 2004a), oral dose-response values are only adjusted using an oral ABS value if the COPC has an oral ABS value less than 50 percent. Otherwise, the oral dose-response value is used as the dermal dose-response value.

Sources of Dose-Response Values

The following hierarchy of sources, established by EPA (USEPA, 2003), has been used to identify CSF and RfD values for this risk assessment.

Tier 1- IRIS (http://www.epa.gov/iris/). In accordance with USEPA guidance, the main source of dose-response values is the USEPA IRIS, which is a database established by USEPA containing all validated data on many toxic substances found at hazardous waste Sites. This database, current as of July, 2007, was used to identify the majority of CSF and RfD values applied in this risk assessment.

Tier 2- NCEA's provisional peer reviewed toxicity values (PPRTVs) (http://hhpprtv.ornl.gov/). National Center for Environmental Assessment (NCEA) PPRTVs are developed by the Superfund Technical Support Center (STSC) for the EPA Superfund program. STSC's reassessment of Health Effects Assessment Summary Table (HEAST) toxicity values, as well as development of PPRTVs in response to Regional or Headquarters Superfund program requests, are consistent with Agency practices on toxicity value development, use the most recent scientific literature, and are supported by both internal and external peer review, providing a high level of confidence in the use of these values in the Superfund Program. The PPRTVs used in this risk assessment are current as of April, 2007.

Tier 3 - Other toxicity values

- Cal EPA's toxicity values. Cal EPA develops toxicity values for both cancer and non-cancer effects. Cal EPA toxicity values are obtained on the Cal EPA website at http://www.oehha.ca.gov/risk/chemicalDB//index.asp. The Cal EPA toxicity values used in this risk assessment are current as of April, 2007.

- Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs) address non-cancer effects only, and are available on the ATSDR website at http://www.atsdr.cdc.gov/mrls.html. MRL values for chronic exposure were used as chronic RfD values. The MRL values used in this risk assessment are current as of December, 2006.

- Toxicity values remaining in current versions of HEAST (USEPA, 1997).

Dose-response values are presented in **Tables 3-9 through 3-12**.

3.1.4 Risk Characterization

The risk characterization integrates the exposure and toxicity information generated in previous sections to qualitatively or quantitatively evaluate the potential health risks associated with exposure to COPCs at the Site. Risk estimates are then evaluated through a comparison to risk management criteria.

Risk Characterization Methods

Quantitative estimates of both carcinogenic and non-carcinogenic risks are calculated for each complete exposure scenario selected for evaluation in the exposure assessment, in accordance with USEPA (1989) guidance. Methods of quantifying cancer and non-cancer risks, and summing total pathway risks, are discussed below.

Carcinogenic Risks. Cancer risks associated with exposure to each COPC are estimated by multiplying the exposure route-pathway specific intake (e.g., oral exposure to groundwater) by its exposure route-specific CSF (e.g., oral CSF). The calculated value is an excess lifetime cancer risk (ELCR) and represents an upper bound of the probability of an individual developing cancer over a lifetime as the result of exposure to a COPC.

Non-carcinogenic Risks. Non-cancer risk estimates are calculated by dividing the COPC intake for each exposure pathway by the appropriate RfD or RfC. The result is called the HQ. The hazard index (HI) is the sum of the chemical-specific HQs for each exposure pathway.

A HI less than 1 indicates that non-carcinogenic toxic effects are unlikely to occur as a result of COPC exposure. HIs greater than 1 may be indicative of a possible non-carcinogenic toxic effect. As the HI increases, so does the likelihood that adverse effects might be associated with exposure. This determination is necessarily imprecise because the RfD is developed using uncertainty factors (uncertainty factors of 10 or greater are not uncommon) to be protective of human health. It is not at all certain, therefore, that an intake that exceeds the RfD would mean that adverse effects would be experienced.

Summary. Risks are summed across all COPCs for each exposure route and each exposure point. Risks across multiple exposure points and multiple exposure media are then summed to yield cumulative cancer and non-cancer risk estimates for the receptor.

Within the risk characterization for each receptor scenario, the relative significance of the risk for each pathway, exposure point, and receptor scenario is evaluated in terms of a comparison with acceptable risk levels established by USEPA. The USEPA guidelines, established in the NCP, indicate that the total excess lifetime cancer risk due to exposure to the chemicals at a site, by each complete exposure pathway, should not exceed a range of 1 in 1,000,000 ($1x10^{-6}$) to 1 in 10,000 ($1x10^{-4}$) (USEPA, 1990). Risks between $1x10^{-6}$ and $1x10^{-4}$ should be considered on a case-by-case basis during the risk management process. According to the NCP, for non-cancer effects, the acceptable risk is associated with chemical concentrations that people (including sensitive individuals such as children) can be exposed to with an adequate margin of safety without adverse effects occurring. This level is generally interpreted by USEPA to be a HI of 1 or less.

Risk Characterization Results

Risk calculations are presented in **Table 3-13**.

Soil – Industrial/Commercial Worker

The risk characterization results for industrial/commercial worker exposure to soil are as follows:

Exposure Route	Cancer Risk (ELCR)	Non-Cancer Risk (HI)
Ingestion	--	0.007
Dermal	--	0.001
Ambient vapor inhalation	--	1
Dust inhalation	--	0.00001
Cumulative	No potentially carcinogenic COPCs	1

As shown, the hazard index is equal to 1. This value does not exceed the threshold HI value of 1. The HI of 1 is primarily associated with inhalation of vapors that may be released from the surface soil to the ambient air. Trimethylbenzenes in soil account for more than 99% of the ambient vapor inhalation risk. Evaluation of the ambient vapor inhalation exposure pathway is based on a conservative model of VOC migration in soil to ambient air.

Groundwater – Industrial/Commercial Worker

The risk characterization results for industrial/commercial worker exposure to groundwater are as follows:

Exposure Route	Cancer Risk (ELCR)	Non-Cancer Risk (HI)
Indoor vapor inhalation	$2x10^{-9}$	0.0001
Cumulative	$2x10^{-9}$	0.0001

As shown, the hazard index is below 1 and the cancer risk is below the NCP risk range of $1x10^{-6}$ to $1x10^{-4}$.

Cumulative Soil and Groundwater – Industrial/commercial Worker

The risks associated with potential exposures to soil are based on exposure assumptions that are protective for full time outdoor workers. Conversely, the risks associated with potential exposures to vapors that may migrate from groundwater are based on exposure assumptions that are protective for full

time indoor workers. The same worker population cannot be indoors and outdoors at the Site full-time (i.e., 8 hours per day). Therefore, summation of soil and groundwater risks represents an overestimation of potential risks. This is in particular the case at Site 04 because risks for soil are primarily associated with the vapor inhalation pathway; the magnitude of risks for that pathway is directly proportional to the amount of time spent outdoors. Nonetheless, summation of risks for soil and groundwater provides an estimate of risks that is conservative for the future land use conditions. The total HI for combined exposure to soil and groundwater is 1, and the total cancer risk for combined exposure to soil and groundwater is $2x10^{-9}$.

The soil, groundwater, and combined soil and groundwater cancer risks are below the NCP risk range of $1x10^{-6}$ to $1x10^{-4}$ and the HI values do not exceed 1. This indicates that use of the Site 04 for full time industrial/commercial or military use, including full time worker contact with soil and full-time occupancy of a building subject to vapor intrusion of VOCs from shallow groundwater, is associated with health risks that do not exceed USEPA risk management criteria.

3.1.5 Uncertainty Analysis

This section identifies and discusses uncertainties in the risk assessment. These uncertainties are identified in order to place the results in a context or perspective. Unlike some other assessments, risk assessments rely not just on measured or certain facts, but also on assumptions and estimates, and also policy decisions, in the face of limited or non-existent data. Historically, risk assessments have used highly conservative assumptions in the place of unavailable data, with the net result often being a substantial overestimation of potential risks. This approach was considered the "protective" approach, in that it would overestimate rather than underestimate potential risks. This uncertainty discussion is not intended to identify "problems" with the risk assessment, only to point out how decisions made in the face of uncertainty may have affected the results and conclusions of the assessment. It should be emphasized that the potential risks estimated here are based on numerous assumptions. Each of these assumptions is associated with some uncertainty. Several types of uncertainties should be considered in any human health risk evaluation:

- uncertainties in the nature and extent of release of OHM;
- uncertainties associated with estimating the frequency, duration, and magnitude of possible exposure;
- uncertainties associated with assigning exposure parameters to a heterogeneous population that includes both men and women and young and old (e.g., body weight and ventilation rates);
- uncertainties in estimating carcinogenic slope factors and/or noncarcinogenic measures of toxicity (e.g., RfDs or RfCs); and
- uncertainties about possible synergistic or antagonistic chemical interactions of a chemical mixture.

The uncertainties associated with estimating possible exposure result from the variance in sampling and analytical techniques, and from quantifying parameters that are not directly observed (e.g., frequency and duration of exposure). Because some of these parameters are functions of the behavior patterns and personal habits of the exposed populations, no single value can be assumed to be representative of all possible exposure conditions. The standard of care for environmental risk assessments for addressing many of these uncertainties is to use upper-bound (90th or 95th percentile) estimates of input values, such as exposure parameters and toxicity values.

There are uncertainties in the four areas of risk assessment: hazard identification, toxicity assessment, exposure assessment, and risk characterization. Substantial uncertainties are discussed below.

Exposure Assessment. The Site represents a small area. Therefore, it is unlikely that humans would contact COPCs at the frequency and intensity estimated in this risk assessment. Consequently, the risk characterization represents a conservative assessment of potential exposures and risks.

The HI values are primarily associated with inhalation of trimethylbenzene vapors that may migrate from soil to outdoor air. The ambient air concentrations were estimated using fate and transport modeling that is highly sensitive to variables such as soil moisture content and organic carbon content. Default soil moisture and organic carbon content values were used; these values are based on relatively dry, organic-free soil conditions. Therefore, the outdoor air vapor concentrations and associated risks are unlikely to be underestimated.

Toxicity Assessment. The VOC 4-iso-propyltoluene was selected as a COPC in soil and groundwater. This VOC was retained as a COPC because no screening values are available for it, and in accordance with the COPC selection methodology, constituents that do not have screening values are retained as COPCs. However, no dose-response values are available for this compound in any of the EPA-approved sources for dose-response values (USEPA, 2003). Therefore, health risks associated with potential exposures to this VOC could not be quantitatively characterized.

The concentration of 4-iso-propyltoluene in soil and groundwater is similar to the concentrations of other structurally similar VOCs in those media (e.g., propylbenzene, isopropylbenzene, butylbenzenes). If one were to assume that 4-iso-propyltoluene had a toxicity similar to that of those other structurally similar compounds, the HI values associated with 4-iso-propyltoluene would be negligible (below 0.01).

Risk Characterization. Overall, given the application of conservative risk assessment methods and assumptions, the results and conclusions of the risk assessment represent a sound, defensible characterization of potential current and future risks to human health.

3.2 Ecological Risk Evaluation

Ecological risks associated with Site 04 are negligible due to the limited habitat at the AMSA 68 (G) facility. Additionally, the contaminants detected at Site 04 are primarily associated with subsurface soils. The majority of the AMSA 68 (G) facility is paved or covered by a building.

The sparsely grassed area in the immediate vicinity of the Site 04 - PDA would provide a relatively low quality habitat (i.e., maintained grass) for ecological receptors. Higher quality habitat is available in other areas nearby (e.g., off-property wooded buffer strip and adjacent properties) that have not been affected by activities at the AMSA 68 (G) facility. Investigation results indicate that contaminants detected at Site 04 are primarily associated with subsurface soils (greater than 6 inches in depth), and exposures of ecological receptors to subsurface soils are presumed to be negligible.

Therefore, it is unlikely that surface soil in the vicinity of the Site 04 - PDA would pose any significant risk to resident or migratory species.

Table 3-1
Summary of Remedial Investigation Explorations and Analyses
Site 04 - Potential Past Disposal Area

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

									Analysis/Method						
Site No.	Media	Loc Name	Field Sample Id	Sample Collection Method	Field Sample Date	Top Depth (ft,bgs)	Bottom Depth (ft,bgs)	Used in Risk Assessment?	VOCs /8260B	SVOCs /8270C Modified	MADEP EPH	MADEP VPH	GRO /8015M	DRO /8015M	Lead /6020
04	SOIL	SS-01	RI22-SBS0102	GeoProbe™	1/19/2006	1	2	Yes	X		X	X			X
04	SOIL	SS-02	RI22-SBS0202	GeoProbe™	1/18/2006	1	2	Yes	X		X	X			X
04	SOIL	SS-03	RI22-SBS0301	GeoProbe™	1/18/2006	0	1	Yes	X		X	X			X
04	SOIL	SS-04	RI22-SBS0402	GeoProbe™	1/19/2006	1	2	Yes	X		X	X			X
04	SOIL	SS-05	RI22-SBS0502	GeoProbe™	1/18/2006	1	2	Yes	X		X	X			X
04	SOIL	SS-06	RI22-SBS0601	GeoProbe™	1/19/2006	0	1	Yes	X		X	X			X
04	SOIL	SS-06	RI22-SBS0603	GeoProbe™	1/19/2006	2	3	Yes	X		X	X			X
04	SOIL	SS-07	RI22-SBS0702	GeoProbe™	1/19/2006	1	2	Yes	X		X	X			X
04	SOIL	SS-07	RI22-SBS0711	GeoProbe™	1/25/2006	10	11	Yes	X		X	X			X
04	SOIL	SS-08	RI22-SBS0802	GeoProbe™	1/19/2006	1	2	Yes	X		X	X			X
04	SOIL	SS-09	RI22-SBS0902	GeoProbe™	1/24/2006	1	2	Yes	X		X	X			X
04	SOIL	SS-10	RI22-SBS1002	GeoProbe™	1/25/2006	1	2	Yes	X		X	X			X
04	SOIL	SS-11	RI22-SSS1100	GeoProbe™	5/10/2007	0	1	Yes [1]	X				X	X	
04	SOIL	SS-12	RI22-SSS1201	GeoProbe™	5/10/2007	1	2	Yes	X				X	X	
04	SOIL	SS-13	RI22-SSS1301	GeoProbe™	5/10/2007	1	2	Yes	X				X	X	
04	SOIL	SS-14	RI22-SSS1401	GeoProbe™	5/10/2007	1	2	Yes	X				X	X	
04	SOIL	SS-15	RI22-SSS1501	GeoProbe™	5/10/2007	1	2	Yes	X				X	X	
04	SOIL	SS-16	RI22-SSS1600	GeoProbe™	5/10/2007	0	1	Yes	X				X	X	
04	SOIL	SS-17	RI22-SSS1701	GeoProbe™	5/11/2007	1	2	Yes [1]	X				X	X	
04	SOIL	SS-18	RI22-SSS1800	GeoProbe™	5/11/2007	0	1	Yes [1]	X				X	X	
04	SOIL	SS-19	RI22-SSS1901	GeoProbe™	5/11/2007	1	2	Yes [1]	X				X	X	
04	SOIL	SS-20	RI22-SSS2000	GeoProbe™	5/11/2007	0	1	Yes	X				X	X	
04	GW	SS-01	RI22-GWS0101	GeoProbe™	1/19/2006	1	4	Yes	X						**Y**
04	GW	SS-02	RI22-GWS0201	GeoProbe™	1/18/2006	1	4	Yes	X						**Y**
04	GW	SS-03	RI22-GWS0301	GeoProbe™	1/18/2006	0.3	4	Yes	X						**Y**
04	GW	SS-04	RI22-GWS0401	GeoProbe™	1/19/2006	2	4	Yes	X						**Y**
04	GW	SS-05	RI22-GWS0501	GeoProbe™	1/19/2006	0.6	4	Yes	X						**Y**
04	GW	SS-06	RI22-GWS0601	GeoProbe™	1/19/2006	1.8	4	Yes	X						**Y**
04	GW	SS-07	RI22-GWS0701	GeoProbe™	1/19/2006	0.4	4	Yes	X						**Y**
04	GW	SS-08	RI22-GWS0801	GeoProbe™	1/20/2006	3.5	4	Yes	X						**Y**
04	GW	SS-09	RI22-GWS0901	GeoProbe™	1/26/2006	2	12	Yes	X						**Y**
04	GW	SS-10	RI22-GWS1001	GeoProbe™	1/26/2006	1	4	Yes	X						**Y**
04	GW	MW-1	RI22-GWSMW101	Mon. Well	1/27/2006	10	20	No	X						**Y**
04	GW	MW-2	RI22-GWSMW201	Mon. Well	1/30/2006	9	19	No	X						**Y**
04	GW	MW-8	RI22-GWSMW801	Mon. Well	1/30/2006	6	16	No	X						**Y**
04	GW	MW-14	RI22-GWSMW1401	Mon. Well	1/30/2006	2	12	Yes	X						**Y**
04	GW	MW-15	RI22-GWSMW1501	Mon. Well	1/30/2006	2	12	Yes	X						**Y**
04	GW	GP-01	RI 22 GPS 0101	GeoProbe™	5/8/2007	2.5	7.5	Yes	X						**Y**
04	GW	GP-01	RI22-GPS0114	GeoProbe™	5/17/2007	14	16	No	X						

Table 3-1
Summary of Remedial Investigation Explorations and Analyses
Site 04 - Potential Past Disposal Area

Lincoln, Rhode Island
MACTEC Engineering and Consulting, Inc.

									Analysis/Method						
Site No.	Media	Loc Name	Field Sample Id	Sample Collection Method	Field Sample Date	Top Depth (ft,bgs)	Bottom Depth (ft,bgs)	Used in Risk Assessment?	VOCs /8260B	SVOCs /8270C Modified	MADEP EPH	MADEP VPH	GRO /8015M	DRO /8015M	Lead /6020
04	GW	GP-02	RI 22 GPS 0201	GeoProbe™	5/8/2007	3.7	7.7	Yes [1]	X						**Y**
04	GW	GP-02	RI22-GPS0214	GeoProbe™	5/17/2007	14	16	No	X						
04	GW	GP-03	RI22-GPS0301	GeoProbe™	5/9/2007	3.1	5	Yes [1]	X						**Y**
04	GW	GP-04	RI22-GPS0401	GeoProbe™	5/9/2007	5.7	7.2	Yes [1]	X						**Y**
04	GW	GP-05	RI 22 GPS 0501	GeoProbe™	5/8/2007	4	8	Yes [1]	X						**Y**
04	GW	GP-06	RI 22 GPS 0601	GeoProbe™	5/8/2007	3.6	7.2	Yes [1]	X						**Y**
04	GW	GP-07	RI22-GPS0701	GeoProbe™	5/9/2007	4.5	8.7	Yes [1]	X						**Y**
04	GW	MW-1	RI22-GWSMW102	Mon. Well	6/26/2007	6	16	No	X						
04	GW	MW-2	RI22-GWSMW202	Mon. Well	6/26/2007	6	16	No	X						
04	GW	MW-8	RI22-GWSMW802	Mon. Well	6/27/2007	6	16	No	X						
04	GW	MW-14	RI22-GWSMW1402	Mon. Well	6/27/2007	2	12	Yes	X						
04	GW	MW-14D	RI22-MWS14D01	Mon. Well	5/18/2007	10	20	No	X						
04	GW	MW-14D	RI23-GWSMW14D02	Mon. Well	6/26/2007	10	20	No	X						
04	GW	MW-15	RI23-GWSMW1502	Mon. Well	6/26/2007	2	12	Yes	X						
04	GW	MW-15D	RI23-GWSMW15D02	Mon. Well	6/25/2007	10.2	15.2	No	X						
04	GW	MW-20	RI22-GWSM2002	Mon. Well	6/26/2007	2	12	Yes	X						
04	GW	MW-20D	RI22-MWS20D01	Mon. Well	5/31/2007	10	20	No	X						
04	GW	MW-20D	RI23-GWSMW20D02	Mon. Well	6/26/2007	10	20	No	X						
04	GW	MW-21	RI22-GWSMW2102	Mon. Well	6/26/2007	2	12	Yes	X						
04	GW	MW-21D	RI23-GWSMW21D02	Mon. Well	6/26/2007	12.5	17.5	No	X						
04	GW	MW-22	RI23-GWSMW2202	Mon. Well	6/27/2007	2	12	Yes	X						
04	GW	MW-22D	RI23-GWSMW22D02	Mon. Well	6/27/2007	12	17	No	X						
04	GW	MW-24	RI23-GWSMW24D02	Mon. Well	6/27/2007	10	15	No	X						

NOTES:

[1] - This sample is included in the data set used to select chemicals of potential concern, but is not included in the exposure point data set used to calculate exposure point concentrations because it represents a clean perimeter sample.

bgs - below ground surface
Bkgd - background
DRO - diesel range organics
EPH - extractable petroleum hydrocarbons
ft - feet
GRO - gasoline range organics
GW - groundwater
MADEP - Massachussetts Department of Environmental Protection
PID - photoionization detector
SVOCs - semivolatile organic compounds
VOCs - volatile organic compouds
VPH - volatile petroleum hydrocarbons
X - sample collected
Y - unfiltered and filtered (total and dissolved fractions) sample collected

Table 3-2
Selection of Chemicals of Potential Concern - Soil

Site 04 - Potential Past Disposal Area
Lincoln, Rhode Island

CAS Number	Chemical	Minimum (1) Concentration (Qualifier)		Maximum (1) Concentration (Qualifier)		Units	Sample ID of Maximum Concentration	Frequency of Detection	Range of Non Detects	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (4)		Potential ARAR/TBC Value (5)	Potential ARAR/TBC Source	Retain as COPC?	Rationale for Contaminant Deletion or Selection (6)
	Volatile Organics																
71-55-6	1,1,1-Trichloroethane	0.00108	J	0.00309	J	mg/kg	RI22-SBS0202	2 / 21	0.00533 - 2.79	0.00309		1200	sat			No	BSL
95-63-6	1,2,4-Trimethylbenzene	0.00134	J	1030		mg/kg	RI22-SBS0502	13 / 21	0.00599 - 0.0783	1030		5.2	nc			Yes	ASL
108-67-8	1,3,5-Trimethylbenzene	0.00453	J	326		mg/kg	RI22-SBS0502	11 / 21	0.00533 - 0.0783	326		2.1	nc			Yes	ASL
78-93-3	2-Butanone	0.00592	J	0.0646	J	mg/kg	RI22-SBS0502	4 / 18	0.0107 - 5.59	0.0646		2200	nc			No	BSL
99-87-6	4-iso-Propyltoluene	0.0166	J	56.2	J	mg/kg	RI22-SBS0502	10 / 21	0.00533 - 0.0783	56.2						Yes	NSL
67-64-1	Acetone	0.0706		0.195	J	mg/kg	RI22-SBS0502	4 / 16	0.0107 - 1.99	0.195		1400	nc			No	BSL
71-43-2	Benzene	0.000927	J	0.012	J	mg/kg	RI22-SBS0502	2 / 21	0.00533 - 2.79	0.012		0.64	ca*			No	BSL
156-59-2	Cis-1,2-Dichloroethene	0.0121	J	0.284	J	mg/kg	RI22-SBS0802	3 / 21	0.00533 - 2.79	0.284		4.3	nc			No	BSL
100-41-4	Ethyl benzene	0.00334	J	1.05		mg/kg	RI22-SBS0102	9 / 21	0.00533 - 0.697	1.05		400	sat			No	BSL
98-82-8	Isopropylbenzene	0.00601	J	25	J	mg/kg	RI22-SBS0502	11 / 21	0.00533 - 0.0783	25		57	nc			No	BSL
91-20-3	Naphthalene	0.00445	J	9.91	J	mg/kg	RI22-SBS1002	13 / 21	0.012 - 0.0783	9.91		5.6	nc			Yes	ASL
104-51-8	n-Butylbenzene	0.00136	J	53	J	mg/kg	RI22-SBS0502	9 / 21	0.00533 - 0.0797	53		240	sat			No	BSL
95-47-6	o-Xylene	0.00112	J	29.6	J	mg/kg	RI22-SBS0502	10 / 21	0.00533 - 0.697	29.6		27	nc			Yes	ASL
103-65-1	Propylbenzene	0.00934	J	77.5	J	mg/kg	RI22-SBS0502	11 / 21	0.00533 - 0.0783	77.5		240	sat			No	BSL
135-98-8	sec-Butylbenzene	0.00345	J	34	J	mg/kg	RI22-SBS0502	11 / 21	0.00533 - 0.0783	34		240	sat			No	BSL
98-06-6	tert-Butylbenzene	0.00164	J	4.8	J	mg/kg	RI22-SBS0502	8 / 21	0.00533 - 0.75	4.8		390	sat			No	BSL
108-88-3	Toluene	0.000909	J	1.12	J	mg/kg	RI22-SBS0502	9 / 21	0.00533 - 2.79	1.12		520	sat			No	BSL
156-60-5	trans-1,2-Dichloroethene	0.0947	J	0.0947	J	mg/kg	RI22-SBS0802	1 / 21	0.00533 - 2.79	0.0947		6.9	nc			No	BSL
79-01-6	Trichloroethene	0.000853	J	0.00209	J	mg/kg	RI22-SBS0502	2 / 21	0.00533 - 2.79	0.00209		0.053	ca			No	BSL
HLA0010	Xylene, m/p	0.000823	J	8.59	J	mg/kg	RI22-SBS0502	11 / 21	0.00533 - 0.157	8.59		27	nc			No	BSL
1330-20-7	Xylenes, Total	0.941	D	1.06	D	mg/kg	RI22-SSS1301	2 / 10	0.133 - 0.235	1.06		27	nc			No	BSL
	Inorganics																
7439-92-1	Lead	10.5		124		mg/kg	RI22-SBS0301	11 / 11		124		400	nc			No	BSL
	TPH																
HLA0026	Diesel Range Organics	68.5		2750		mg/kg	RI22-SSS1401	5 / 10	38.7 - 47.7	2750						Yes	NSL
HLA0025	Gasoline Range Organics	1.92		126	D	mg/kg	RI22-SSS1401	6 / 10	1.15 - 2.22	126						Yes	NSL
	VPH																
100-41-4	Ethyl benzene	1.2		1.68		mg/kg	RI22-SBS0102	2 / 11	0.54 - 0.9	1.68		400	sat			No	BSL
91-20-3	Naphthalene	1.71		11.3		mg/kg	RI22-SBS0502	7 / 11	0.67 - 0.9	11.3		5.6	nc			Yes	ASL
95-47-6	o-Xylene	0.434	J	34.1		mg/kg	RI22-SBS0502	7 / 11	0.67 - 0.9	34.1		27	nc			Yes	ASL
108-88-3	Toluene	0.694	J	3.19		mg/kg	RI22-SBS0802	2 / 11	0.54 - 0.9	3.19		520	sat			No	BSL
HLA0010	Xylene, m/p	0.458	J	7.95		mg/kg	RI22-SBS0502	7 / 11	0.67 - 0.9	7.95		27	nc			No	BSL
HLA0155	C5-C8 Aliphatics	13		85.7		mg/kg	RI22-SBS0502	4 / 11	12 - 18	85.7						Yes	NSL
HLA0258	C5-C8 Aliphatics (unadj.)	13.3		86.4		mg/kg	RI22-SBS0502	4 / 11	12 - 18	86.4						Yes	NSL
HLA0259	C9-C10 Aromatics	86.4		1710		mg/kg	RI22-SBS0502	8 / 11	13 - 18	1710						Yes	NSL
HLA0154	C9-C12 Aliphatics	52.1		1980		mg/kg	RI22-SBS0502	8 / 11	13 - 18	1980						Yes	NSL
HLA0260	C9-C12 Aliphatics (unadj.)	176		3730		mg/kg	RI22-SBS0502	8 / 11	13 - 18	3730						Yes	NSL

Table 3-2
Selection of Chemicals of Potential Concern - Soil

Site 04 - Potential Past Disposal Area
Lincoln, Rhode Island

CAS Number	Chemical	Minimum (1) Concentration (Qualifier)		Maximum (1) Concentration (Qualifier)		Units	Sample ID of Maximum Concentration	Frequency of Detection	Range of Non Detects	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (4)	Potential ARAR/TBC Value (5)	Potential ARAR/TBC Source	Retain as COPC?	Rationale for Contaminant Deletion or Selection (6)
	EPH															
91-57-6	2-Methylnaphthalene	1.96		7.46		mg/kg	RI22-SBS1002	6 / 11	0.56 - 0.68	7.46		5.6 nc			Yes	ASL
83-32-9	Acenaphthene	0.498	J	0.778		mg/kg	RI22-SBS1002	4 / 11	0.56 - 0.68	0.778		370 nc			No	BSL
191-24-2	Benzo(ghi)perylene	0.465	J	2.27		mg/kg	RI22-SBS0603	9 / 11	0.58 - 0.62	2.27		230 nc			No	BSL
206-44-0	Fluoranthene	0.642		0.642		mg/kg	RI22-SBS0601	1 / 11	0.57 - 0.68	0.642		230 nc			No	BSL
86-73-7	Fluorene	0.631		1.67		mg/kg	RI22-SBS1002	5 / 11	0.56 - 0.68	1.67		270 nc			No	BSL
91-20-3	Naphthalene	0.474	J	4.8		mg/kg	RI22-SBS0502	7 / 11	0.56 - 0.68	4.8		5.6 nc			No	BSL
85-01-8	Phenanthrene	0.471	J	1.56		mg/kg	RI22-SBS0502	6 / 11	0.56 - 0.68	1.56		230 nc			No	BSL
129-00-0	Pyrene	0.491	J	0.491	J	mg/kg	RI22-SBS0601	1 / 11	0.57 - 0.68	0.491		230 nc			No	BSL
HLA0108	C11-C22 Aromatics	22.2	J	1240		mg/kg	RI22-SBS0301	11 / 11		1240					Yes	NSL
HLA0257	C11-C22 Aromatics (unadj.)	23.8	J	1240		mg/kg	RI22-SBS0301	11 / 11		1240					Yes	NSL
HLA0109	C19-C36 Aliphatics	13.1		4870		mg/kg	RI22-SBS0902	11 / 11		4870					Yes	NSL
HLA0113	C9-C18 Aliphatics	12.4		4380		mg/kg	RI22-SBS0902	11 / 11		4380					Yes	NSL

(1) Minimum or maximum concentration detected in data set. Samples included in data set are identified in Table 3-1.
(2) The concentration used for screening is the maximum detected concentration.
(3) Background values not available.
(4) Values are the Preliminary Remediation Goals (PRGs) obtained from USEPA Region IX dated October 2004.
Values used for screening are the residential soil PRGs for the lesser of cancer risks equal to 1E-06 or non-cancer risks equal to a hazard index of 0.1.
PRG for pyrene used for phenanthrene, benzo(g,h,i)perylene.
PRG for n-butylbenzene used for sec-butylbenzene.
nc - PRG is based on a non-cancer hazard quotient of 0.1.
ca - PRG is based on an excess lifetime cancer risk of 1 in 1 million.
ca* - where nc PRG < 100X ca PRG.
nc[a] - Value is based on a non-cancer endpoint because PRG at HI=0.1 is lower than PRG at cancer risk 1 in 1 million.
(5) There are no applicable ARARs for this exposure point.
(6) Analyte is selected as a COPC if the concentration used for screening exceeds the PRG or if no screening value is available.
BSL = Concentration used for screening is less than the screening toxicity value; the analyte was not selected as a COPC.
ASL = Concentration used for screening is greater than the screening toxicity value; the analyte was selected as a COPC.
NSL = no screening toxicity value available; the analyte was selected as a COPC.

mg/Kg = milligrams per kilogram
COPC = chemical of potential concern
J - Value is estimated.
D - Value is from a diluted sample.

Table 3-3
Selection of Chemicals of Potential Concern - Groundwater

Site 04 - Potential Past Disposal Area
Lincoln, Rhode Island

Chemical	Minimum (1) Concentration (Qualifier)		Maximum (1) Concentration (Qualifier)		Units	Sample ID of Maximum Concentration	Frequency of Detection			Range of Non Detects			Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (4)		Potential ARAR/TBC Value (5)	Potential ARAR/TBC Source	Retain as COPC?	Rationale for Contaminant Deletion or Selection (6)
Volatile Organics																				
1,1-Dichloroethane	0.000403	J	0.0204		mg/L	RI22-GWS0801	4	/	24	0.001	:	0.001	0.0204		0.22	NC			No	BSL
1,2,4-Trimethylbenzene	0.0017		0.533		mg/L	RI22-GWS0801	14	/	24	0.001	:	0.001	0.533		0.0024	NC			Yes	ASL
1,2-Dichlorobenzene	0.000187	J	0.000187	J	mg/L	RI22-GWS0801	1	/	24	0.001	:	0.001	0.000187		0.26	NC			No	BSL
1,2-Dichloroethane	0.000396	J	0.000396	J	mg/L	RI22-GWS0901	1	/	24	0.001	:	0.001	0.000396		0.005	C			No	BSL
1,3,5-Trimethylbenzene	0.0031		0.196		mg/L	RI22-GWS1001	13	/	24	0.001	:	0.001	0.196		0.0025	NC			Yes	ASL
1,3-Dichloropropane	0.001		0.001		mg/L	RI22-GWSMW1402	1	/	24	0.001	:	0.001	0.001		0.0035	NC			No	BSL
2-Butanone	0.00393	J	0.0081	J	mg/L	RI22-GWS0801	4	/	23	0.01	:	0.025	0.0081		44	NC			No	BSL
4-iso-Propyltoluene	0.000667	J	0.0223		mg/L	RI22-GWS1001	11	/	24	0.001	:	0.001	0.0223						Yes	NSL
Acetone	0.00318	J	0.0363	J	mg/L	RI22-GWS1001	10	/	22	0.025	:	0.025	0.0363		22	NC			No	BSL
Benzene	0.000144	J	0.202	D	mg/L	RI22-GWSMW1402	14	/	24	0.001	:	0.001	0.202		0.005	C			Yes	ASL
Chlorobenzene	0.000161	J	0.00026	J	mg/L	RI22-GWS0601	2	/	24	0.001	:	0.001	0.00026		0.039	NC			No	BSL
Chloroethane	0.000692	J	0.0173		mg/L	RI22-GWS0801	4	/	24	0.001	:	0.002	0.0173		2.8	NC			No	BSL
Cis-1,2-Dichloroethene	0.000332	J	0.00514		mg/L	RI22-GWS0801	7	/	24	0.001	:	0.001	0.00514		0.021	NC			No	BSL
Ethyl benzene	0.00074	J	0.103		mg/L	RI22-GWS0801	13	/	24	0.001	:	0.001	0.103		0.7	C			No	BSL
Isopropylbenzene	0.000656	J	0.0243		mg/L	RI22-GWS0801	13	/	24	0.001	:	0.001	0.0243		0.00084	NC			Yes	ASL
Naphthalene	0.00182		0.159		mg/L	RI22-GWS0801	11	/	24	0.001	:	0.001	0.159		0.015	NC			Yes	ASL
n-Butylbenzene	0.000728	J	0.0306		mg/L	RI22-GWS1001	11	/	24	0.001	:	0.001	0.0306		0.026	NC			Yes	ASL
o-Xylene	0.00186		0.161		mg/L	RI22-GWS0801	12	/	24	0.001	:	0.001	0.161		3.3	NC			No	BSL
Propylbenzene	0.001		0.0476		mg/L	RI22-GWS0801	14	/	24	0.001	:	0.001	0.0476		0.032	NC			Yes	ASL
p-Xylene	0.0036		0.0785		mg/L	RI22-GWSMW1402	2	/	5	0.002	:	0.002	0.0785		2.2	NC			No	BSL
sec-Butylbenzene	0.000482	J	0.00911		mg/L	RI22-GWS0501	12	/	24	0.001	:	0.001	0.00911		0.025	NC			No	BSL
t-Butyl alcohol	0.0582	J	0.0582	J	mg/L	RI22-GWS0201	1	/	12	0.1	:	0.1	0.0582						No	NV
tert-Butylbenzene	0.000305	J	0.00387		mg/L	RI22-GWS1001	8	/	24	0.001	:	0.001	0.00387		0.029	NC			No	BSL
Toluene	0.000368	J	0.127		mg/L	RI22-GWS0801	10	/	24	0.001	:	0.001	0.127		0.15	NC			No	BSL
trans-1,2-Dichloroethene	0.000366	J	0.000732	J	mg/L	RI22-GWS0801	2	/	24	0.001	:	0.001	0.000732		0.018	NC			No	BSL
Vinyl chloride	0.000252	J	0.00142		mg/L	RI22-GWS0801	2	/	24	0.001	:	0.001	0.00142		0.002	C			No	BSL
Xylene, m/p	0.0013		0.344		mg/L	RI22-GWS0801	11	/	19	0.001	:	0.002	0.344		2.2	NC			No	BSL
Xylenes, Total	0.0055		0.096		mg/L	RI22-GWSMW1402	2	/	12	0.003	:	0.003	0.096		2.2	NC			No	BSL
Inorganics																				
Lead (Total)	0.011		2.26		mg/L	RI22-GWS0101	16	/	18	0.01	:	0.01	2.26						No	NV
Lead (Dissolved))	0.00276		0.116		mg/L	RI22-GWS0601	11		19	0.001	:	0.01	0.116						No	NV

(1) Minimum or maximum concentration detected in data set. Samples included in data set are identified in Table 3-1.
(2) The concentration used for screening is the maximum detected concentration.
(3) Background values not available.
(4) Values are the Target Groundwater Concentrations published in Table 2c of "Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils".
Values used for screening are based on the lesser of cancer risks equal to 1E-06 or non-cancer risks equal to a hazard index of 0.1.
Value for 1,2-dichloropropane used for 1,3-dichloropropane.
nc - PRG is based on a non-cancer hazard quotient of 0.1.
ca - PRG is based on an excess lifetime cancer risk of 1 in 1 million.
(5) There are no applicable ARARs for this exposure point.
(6) Analyte is selected as a COPC if the concentration used for screening exceeds the PRG or if no screening value is available.
BSL = Concentration used for screening is less than the screening toxicity value; the analyte was not selected as a COPC.
ASL = Concentration used for screening is greater than the screening toxicity value; the analyte was selected as a COPC.
NSL = no screening toxicity value available; the analyte was selected as a COPC.
NV = Chemical not sufficiently volatile to pose a potential vapor intrusion concern.

mg/L = milligrams per liter
COPC = chemical of potential concern
J - Value is estimated.
D - Value is from a diluted sample.

Prepared by: KJC
Checked by: JHP

Table 3-4
Selection of Exposure Pathways

Site 04 - Potential Past Disposal Area
Lincoln, Rhode Island

Scenario Timeframe	Medium	Exposure Medium	Exposure Points	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
CURRENT	Soil	Surface Soil 0 - 2 ft	Site 04	Area Resident / Trespasser	Adult	Dermal	None	Area residents and others do not have access to this area due to the secure nature of the military installation.
						Ingestion	None	
					Child	Dermal	None	
						Ingestion	None	
				Commercial/Industrial Worker	Adult	Dermal	Qualitative	Military personnel access the facility, but have limited contact with soil; evaluation of future exposures to soil is conservative for the current land use conditions.
						Ingestion	Qualitative	
		Air - Dust	Site 04	Area Resident / Trespasser	Adult	Inhalation	None	Area is grass-covered; minimal dust liberation under current conditions.
					Child	Inhalation	None	
				Commercial/Industrial Worker	Adult	Inhalation	Qualitative	
		Air - Vapors	Site 04	Area Resident / Trespasser	Adult	Inhalation	None	Military personnel access the facility, but have limited contact with soil; evaluation of future exposures to soil is conservative for the current land use conditions.
					Child	Inhalation	None	
				Commercial/Industrial Worker	Adult	Inhalation	Qualitative	
	Groundwater	Groundwater	GB Aquifer	Area Resident	Adult	Dermal	None	Groundwater is Class GB and is not used for water supply. Water to facility and surrounding area is municipally-supplied.
						Ingestion	None	
				Commercial/Industrial Worker	Adult	Dermal	None	Groundwater is GB and is not used for water supply. Water to facility and surrounding area is municipally-supplied. No COPCs were identified in groundwater; therefore, there is no complete pathway to site-related contaminants in groundwater.
						Ingestion	None	
		Air - Vapors	GB Aquifer	Area Resident / Trespasser	Adult	Inhalation	None	VOCs in groundwater are not located near any occupied buildings; therefore, vapor intrusion pathway is not complete under current use conditions.
					Child	Inhalation	None	
				Commercial/Industrial Worker	Adult	Inhalation	None	
FUTURE	Soil	Soil 0 - 2 ft	Site 04	Resident	Adult	Dermal	None	Future use is military/commercial-industrial; residential use will not occur.
						Ingestion	None	
					Child	Dermal	None	
						Ingestion	None	
				Recreational Visitor	Adult	Dermal	None	Future use is military/commercial-industrial; residential use will not occur.
						Ingestion	None	
					Child	Dermal	None	
						Ingestion	None	
				Commercial/Industrial Worker	Adult	Dermal	Quantitative	Future use is military/commercial-industrial; contact with soil could occur.
						Ingestion	Quantitative	
				Construction worker	Adult	Dermal	Qualitative	Commercial/industrial worker scenario is protective for construction worker scenario.
						Ingestion	Qualitative	
		Air - Dust	Site 04	Resident	Adult	Inhalation	None	Future use is military/commercial-industrial; liberation of soil-derived dust could occur.
					Child	Inhalation	None	
				Recreational Visitor	Adult	Inhalation	None	
					Child	Inhalation	None	
				Commercial/Industrial Worker	Adult	Inhalation	Quantitative	
				Construction worker	Adult	Inhalation	Qualitative	
		Air - Vapors	Site 04	Resident	Adult	Inhalation	None	Future use is military/commercial-industrial; release of VOCs from unsaturated surface soil could occur.
					Child	Inhalation	None	
				Recreational Visitor	Adult	Inhalation	None	
					Child	Inhalation	None	
				Commercial/Industrial Worker	Adult	Inhalation	Quantitative	
				Construction worker	Adult	Inhalation	Qualitative	
	Groundwater	Groundwater	GB Aquifer	Resident	Adult	Dermal	None	Groundwater is Class GB and is not used for water supply. Water to facility and surrounding area is municipally-supplied.
						Ingestion	None	tap water use. Residential use will not occur.
				Recreational Visitor	Adult	Dermal	None	Future use is military/commercial-industrial; residential use will not occur.
						Ingestion	None	
					Child	Dermal	None	
						Ingestion	None	
				Commercial/Industrial Worker	Adult	Dermal	None	Groundwater is GB and is not used for water supply. Water to facility and surrounding area is municipally-supplied.
						Ingestion	None	
				Construction worker	Adult	Dermal	None	Excavation into the groundwater table, which would require dewatering activities, etc, is unlikely. In addition, construction workers would wear normal protective work gear (e.g., boots) in anticipation of excavations into the groundwater table.
						Ingestion	None	
		Air - Vapors	GB Aquifer	Area Resident / Trespasser	Adult	Inhalation	None	VOCs in groundwater could migrate to indoor air if a building is constructed at the Site. People who occupy the building could be exposed to VOCs in groundwater via vapor intrusion to indoor air.
					Child	Inhalation	None	
				Commercial/Industrial Worker	Adult	Inhalation	Quantitative	

Table 3-5
Values Used for Daily Intake Calculations Reasonable Maximum Exposure - Future Land Use Soil

Site 04 - Potential Past Disposal Area
Lincoln, Rhode Island

Scenario Timeframe: Future Land Use
Medium: Soil
Exposure Medium: Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Points	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation / Model Name
Ingestion	Commercial / Industrial Worker Outdoor	Adult	Site 04	CS-c	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 2002a	CHEMICAL INTAKE-INGESTION (mg/kg-day)=
				IR-S	Ingestion Rate of Soil	100	mg/day	USEPA, 2002b	CS-c x IR-S x FI x EF x ED x CF1 x 1/BW x 1/AT
				FI	Fraction Ingested	1	unitless	Assumption	
				EF	Exposure Frequency	225	day/yr	USEPA, 2002b	
				ED	Exposure Duration	25	yr	USEPA, 2002b	
				BW	Body Weight	70	kg	USEPA, 2002b	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9125	day	USEPA, 1989 / equal to ED	
				CF1	Conversion Factor	1.E-06	kg/mg		
Dermal	Commercial / Industrial Worker Outdoor	Adult	Site 04	CS	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 2002a	INTAKE-DERMAL (mg/kg-day) =
				DAevent	Dose Absorbed Per Event	chemical-specific	mg/cm^2-event	USEPA, 2004	DAevent x SA x EF x ED x EV x 1/BW x 1/AT
				SA	Skin Surface Area Available for Contact	3300	cm^2	USEPA, 2002b	
				EF	Exposure Frequency	225	day/yr	USEPA, 2002b	Where DAevent =
				ED	Exposure Duration	25	yr	USEPA, 2002b	CS x AF x ABSd x CF
				EV	Events per Day	1	event/day	USEPA, 2002b	
				AF	Adherence Factor	0.2	mg/cm^2-event	USEPA, 2002b	
				ABSd	Dermal Absorption Factor	chemical-specific	unitless	USEPA, 2004	
				BW	Body Weight	70	kg	USEPA, 2002b	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9125	day	USEPA, 1989 / equal to ED	
				CF	Conversion Factor	1E-06	kg/mg		
Dust Inhalation	Commercial / Industrial Worker	Adult	Site 04	CS-c	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 2002a	CHEMICAL INTAKE-INHALATION (ug/m^3) =
				CAair-dust	Concentration in Air - Dust	95% UCL	ug/m^3	Modeled from soil	CAair x ED x EFx ET x 1/AT
				EF	Exposure Frequency - outdoor	225	day/yr	USEPA, 2002b	CAair-dust=
				ED	Exposure Duration	25	yr	USEPA, 2002b	CS-c x 1/PEF x 1000 ug/mg
				ET	Exposure Time	0.33	hr/hr	USEPA, 2002b	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9125	day	USEPA, 1989 / equal to ED	
				PEF	Particulate Emission Factor	1.16E+09	m^3/kg	USEPA, 1996 [1]	
Vapor Inhalation	Commercial / Industrial Worker	Adult	Site 04	CS-c	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 2002a	CHEMICAL INTAKE-INHALATION (ug/m^3) =
				CAair-vapor	Concentration in Air - Vapor	95% UCL	ug/m^3	Modeled from soil	CAair x ED x EFx ET x 1/AT
				EF	Exposure Frequency - outdoor	225	day/yr	USEPA, 2002b	CAair-vapor=
				ED	Exposure Duration	25	yr	USEPA, 2002b	CS-c x 1/VF x 1000 ug/mg
				ET	Exposure Time	0.33	hr/hr	USEPA, 2002b	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9125	day	USEPA, 1989 / equal to ED	
				VF	Volatilization Factor	chemical-specific	m^3/kg	USEPA, 1996 [1]	

USEPA, 1989. "Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A)"; Office of Emergency and Remedial Response; EPA-540/1-89/002 (interim final); Washington, D.C., December.
USEPA, 2002a. "Calculating UpperConfidence Limits for Exposure Point Concentrations at Hazardous Waste Sites". OSWER 9285.6-10. December.
USEPA, 2002b. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December.
USEPA, 2004. "Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

[1] - Calculated as the wind erosion PEF and VF in Appendix E.

NA - Not Applicable
kg - kilograms mg - milligrams ug - micrograms hr - hour UCL - upper confidence limit
cm^2 - square centimeters m^3 - cubic meters yr - year

Prepared by: JHP
Checked by: KJC

Table 3-6
Values Used for Daily Intake Calculations Reasonable Maximum Exposure - Future Land Use Groundwater

Site 04 - Potential Past Disposal Area
Lincoln, Rhode Island

Scenario Timeframe: Future Land Use
Medium: Groundwater
Exposure Medium: Vapors in indoor air

Exposure Route	Receptor Population	Receptor Age	Exposure Points	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation / Model Name
Vapor Inhalation	Commercial / Industrial Worker	Adult	Site 04	CS-gw	Chemical Concentration in Groundwater	Maximum	mg/L		CHEMICAL INTAKE-INHALATION (ug/m^3) =
				CAair-vapor	Concentration in Air - Vapor	Maximum	ug/m^3	Modeled from groundwater [1]	CAair x ED x EFx ET x 1/AT
				EF	Exposure Frequency - outdoor	225	day/yr	USEPA, 2002b	
				ED	Exposure Duration	25	yr	USEPA, 2002b	
				ET	Exposure Time	0.33	hr/hr	USEPA, 2002b	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9125	day	USEPA, 1989 / equal to ED	

USEPA, 1989. "Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A)"; Office of Emergency and Remedial Response; EPA-540/1-89/002 (interim final); Washington, D.C., December.
USEPA, 2002b. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December.
[1] - Calculated using the Johnson-Ettinger Groundwater to Indoor Air Advanced Model (v. 3.1). Calculations are documented in Appendix E.

mg - milligrams
m^3 - cubic meters
ug - micrograms
yr - year
hr - hour

Prepared by: JHP
Checked by: KJC

Table 3-7
Summary of Exposure Point Concentrations - Soil

Site 04 - Potential Past Disposal Area
Lincoln, Rhode Island

								Exposure Point Concentration			
CAS Number	Chemical	Units	Arithmetic Mean (1)	UCL (distribution)		Maximum Concentration (Qualifier)		EPC	Units	Statistic	Rationale
	Volatile Organics										
95-63-6	1,2,4-Trimethylbenzene	mg/kg	92.7	156	NP	1030		156	mg/kg	UCL - 95% KM (BCA)	(3)
108-67-8	1,3,5-Trimethylbenzene	mg/kg	22.1	174	NP	326		174	mg/kg	UCL - 99% KM (Chebyshev)	(3)
99-87-6	4-iso-Propyltoluene	mg/kg	4.70	30.7	NP	56.2	J	30.7	mg/kg	UCL - 99% KM (Chebyshev)	(3)
91-20-3	Naphthalene	mg/kg	1.67	8.44	NP	9.91	J	8.44	mg/kg	UCL - 99% KM (Chebyshev)	(3)
95-47-6	o-Xylene	mg/kg	2.05	15.7	NP	29.6	J	15.7	mg/kg	UCL - 99% KM (Chebyshev)	(3)
	TPH										
HLA0026	Diesel Range Organics	mg/kg	941	1040	NP	2750		1040	mg/kg	UCL - 95% KM (t)	(3)
HLA0025	Gasoline Range Organics	mg/kg	32.7	45.2	NP	126	D	45.2	mg/kg	UCL - 95% KM (BCA)	(3)
	VPH										
91-20-3	Naphthalene	mg/kg	5.80	6.28	NP	11.3		--			(4)
95-47-6	o-Xylene	mg/kg	6.74	10.6	NP	34.1		--			(4)
HLA0155	C5-C8 Aliphatics	mg/kg	33.2	33.5	NP	85.7		33.5	mg/kg	UCL - 95% KM (t)	(3)
HLA0259	C9-C10 Aromatics	mg/kg	481	1025	NP	1710		1025	mg/kg	UCL - 95% KM (Chebyshev)	(3)
HLA0154	C9-C12 Aliphatics	mg/kg	433	1082	NP	1980		1082	mg/kg	UCL - 95% KM (Chebyshev)	(3)
	EPH										
91-57-6	2-Methylnaphthalene	mg/kg	4.68	4.68	NP	7.46		4.68	mg/kg	UCL - 95% KM (t)	(3)
HLA0108	C11-C22 Aromatics	mg/kg	347	796	G	1240		796	mg/kg	UCL - 95% Approx. Gamma	(3)
HLA0109	C19-C36 Aliphatics	mg/kg	1265	4247	G	4870		4247	mg/kg	UCL - 95% Adj. Gamma	(3)
HLA0113	C9-C18 Aliphatics	mg/kg	1380	4699	G	4380		4380	mg/kg	Maximum	(2)

(1) Arithmetic mean is calculated as the arithmetic mean of detected concentrations. Samples included in data set are identified in Table 3-1.
(2) The maximum detected concentration is used as the EPC because it is lower than the calculated 95% UCL.
(3) UCL - The 95% UCL is used as the EPC because the calculated 95% UCL is less than the maximum detected concentration.
UCLs are calculated using ProUCL (V. 4.0); documentation of calculations is provided in Appendix **E**. Samples included in data set are identified in Table 3-1.
(4) The EPC for this chemical by this method is lower than the EPC for this chemical by other analytical methods;
therefore, the EPC will not be based on data for this analytical method.

mg/kg = milligrams per kilogram
EPC = Exposure Point Concentration
UCL = Upper Confidence Limit on the arithmetic mean

J - Value is estimated.
D - Value is from a diluted sample.

NP - Non-Parametric
G - Gamma

Table 3-8
Summary of Exposure Point Concentrations - Groundwater and Indoor Air

Site 04 - Potential Past Disposal Area
Lincoln, Rhode Island

					Exposure Point Concentration - Groundwater				Exposure Point Concentration - Indoor Air (3)	
CAS Number	Chemical	Units	Maximum Concentration (Qualifier) (1)		EPC	Units	Statistic	Rationale	EPC	Units
	Volatile Organics									
95-63-6	1,2,4-Trimethylbenzene	mg/L	0.533		0.533	mg/L	Maximum	(2)	0.0028	ug/m^3
108-67-6	1,3,5-Trimethylbenzene	mg/L	0.196		0.196	mg/L	Maximum	(2)	0.0010	ug/m^3
99-87-6	4-iso-Propyltoluene	mg/L	0.0223		0.022	mg/L	Maximum	(2)	(4)	
71-43-2	Benzene	mg/L	0.202	D	0.202	mg/L	Maximum	(2)	0.0017	ug/m^3
98-82-8	Isopropylbenzene	mg/L	0.0243		0.0243	mg/L	Maximum	(2)	0.00028	ug/m^3
91-20-3	Naphthalene	mg/L	0.159		0.159	mg/L	Maximum	(2)	0.000088	ug/m^3
104-51-8	n-Butylbenzene	mg/L	0.0306		0.0306	mg/L	Maximum	(2)	0.00032	ug/m^3
103-65-1	Propylbenzene	mg/L	0.0476		0.0476	mg/L	Maximum	(2)	0.00044	ug/m^3

(1) Samples used in data set are identified in Table 3-1.
(2) The maximum detected concentration is used as the groundwater source EPC for modeling vapor intrusion to indoor air.
(3) Calculated using the Johnson-Ettinger Groundwater to Indoor Air Advanced Model (V. 3.1). Model calculations are presented in Appendix E.
(4) Chemical-physical data for this compound are not provided in the Johnson-Ettinger model; therefore, an estimated indoor air concentration was not calculated.
mg/L = milligrams per liter
EPC = Exposure Point Concentration
ug/m^3 - micrograms per cubic meter

Table 3-9
Cancer Toxicity Data - Oral/Dermal

Site 04 - Potential Past Disposal Area
Lincoln, Rhode Island

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal (2)		Weight of Evidence/ Cancer Guideline Description	Oral Cancer Slope Factor	
	Value	Units		Value	Units		Source(s)	Date(s)
VOLATILES								
1,2,4-Trimethylbenzene	ND			ND		ND		
1,3,5-Trimethylbenzene	ND			ND		ND		
Benzene	5.5E-02	$(mg/kg/day)^{-1}$	100%	5.5E-02	$(mg/kg/day)^{-1}$	Known carcinogen	IRIS	July, 2007
Butylbenzene, n-	ND			ND		ND		
Isopropylbenzene	NA			NA		Cannot be determined	IRIS	July, 2007
Isopropyltoluene	ND			ND		ND		
Propylbenzene	ND			ND		ND		
Xylenes (total)	NA			NA		Inadequate evidence	IRIS	July, 2007
SEMIVOLATILES								
2-Methylnaphthalene	NA			NA		Inadequate evidence	IRIS	July, 2007
Naphthalene	NA		89%	NA		Cannot be determined	IRIS	July, 2007

Notes:

In accordance with OSWER 9285.7-53, chronic RfDs are identified from the following heirarchy of sources:

Tier 1:

IRIS = Integrated Risk Information System: July, 2007

Tier 2:

PPRTV = Preliminary Peer-Reviewed Reference Toxicity Value April, 2007 Obtained from Region III RBC Table

Tier 3:

HEAST= Health Effects Assessment Summary Tables: FY 1997 Verified using Region IX PRG and/or Region III RBC Table

CALEPA - California Environmental Protection Agency April, 2007

In addition, provisional RfDs developed by NCEA are presented for informational purposes and to be used on a case-by-case basis:

NCEA = National Center for Environmental Assessment: April, 2007 Obtained from Region III RBC Table

Weight of Evidence:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

(1) Values obtained from RAGS Volume 1 (Part E, Supplemental Guidance for Dermal Risk Assessment, Interim Guidance) (EPA, 2004)
Per this guidance, a value of 100% is used for analytes without published values.

(2) Adjusted Dermal SF = Oral SF / Oral to Dermal Adjustment Factor. Per RAGS Part E (USEPA, 2004), adjustments are only performed for chemicals that have an oral absorption efficiency of less than 50%.

mg = milligram

kg = kilogram

BW = body weight

ND = no data available

Table 3-10
Cancer Toxicity Data - Inhalation

Site 04 - Potential Past Disposal Area
Lincoln, Rhode Island

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor (1)		Weight of Evidence/ Cancer Guideline Description	Unit Risk: Inhalation Cancer Slope Factor	
	Value	Units	Value	Units		Source(s)	Date(s)
VOLATILES							
1,2,4-Trimethylbenzene	ND		ND		ND		
1,3,5-Trimethylbenzene	ND		ND		ND		
Benzene	7.80E-06	$(ug/m^3)^{-1}$	2.8E-02	$(mg/kg/day)^{-1}$	Known human carcinogen	IRIS	July, 2007
Butylbenzene, n-	ND		ND		ND		
Isopropylbenzene	NA		NA		Cannot be determined	IRIS	July, 2007
Isopropyltoluene	ND		ND		ND		
Propylbenzene	ND		ND		ND		
Xylenes (total)	NA		NA		Inadequate data	IRIS	July, 2007
SEMIVOLATILES							
2-Methylnaphthalene	NA		NA		Inadequate	IRIS	July, 2007
Naphthalene	NA		NA		Cannot be determined	IRIS	July, 2007

Notes:

In accordance with OSWER 9285.7-53, chronic RfDs are identified from the following heirarchy of sources:

Tier 1:

IRIS = Integrated Risk Information System: July, 2007

Tier 2:

PPRTV = Preliminary Peer-Reviewed Reference Toxicity Value April, 2007 Obtained from Region III RBC Table

Tier 3:

HEAST= Health Effects Assessment Summary Tables: FY 1997 Verified using Region IX PRG and/or Region III RBC Tabl

CALEPA - California Environmental Protection Agency April, 2007

In addition, provisional RfDs developed by NCEA are presented for informational purposes and to be used on a case-by-case basis:

NCEA = National Center for Environmental Assessment: April, 2007 Obtained from Region III RBC Table

(1) - Inhalation cancer dose-response values are typically published as unit risk values. Unit risk values may be converted to slope factors using the following equation (HEAST, 1997):

Adjustment = 70 kg [adult body weight] * 1000 ug/mg [conversion factor] / 20 m3/day [inhalation rate]

and: Inhalation Slope Factor = Unit Risk * Adjustment

Checked by: JHP 04/24/07

Weight of Evidence:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are availabl

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

mg = milligram
ug = microgram

kg = kilogram

m^3 = cubic meter

BW = body weight

ND = no data available

Table 3-11
Non-Cancer Toxicity Data - Oral/Dermal

Site 04 - Potential Past Disposal Area
Lincoln, Rhode Island

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Adjusted Dermal RfD (2)		Primary Target Organ or System / Critical Effect	Combined Uncertainty/Modifying Factors	RfD: Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s)
VOLATILES										
1,2,4-Trimethylbenzene	chronic	5.0E-02	mg/kg/day	100%	5.0E-02	mg/kg/day			PPRTV	September, 2004
	subchronic	5.0E-02	mg/kg/day	100%	5.0E-02	mg/kg/day			Chronic	
1,3,5-Trimethylbenzene	chronic	5.0E-02	mg/kg/day	100%	5.0E-02	mg/kg/day			PPRTV	September, 2004
	subchronic	5.0E-02	mg/kg/day	100%	5.0E-02	mg/kg/day			Chronic	
Benzene	chronic	4.0E-03	mg/kg/day	100%	4.0E-03	mg/kg/day	Immune system; decreased lymphocyte count	300	IRIS	July, 2007
	subchronic	4.0E-03	mg/kg/day	100%	4.0E-03	mg/kg/day	Immune system; decreased lymphocyte count	300	Chronic	
Butylbenzene, n-	chronic	1.0E-02	mg/kg/day	100%	1.0E-02	mg/kg/day			NCEA	September, 2004
	subchronic	1.0E-02	mg/kg/day	100%	1.0E-02	mg/kg/day			Chronic	
Isopropylbenzene	chronic	1.0E-01	mg/kg/day	100%	1.0E-01	mg/kg/day	Kidney; increased kidney weight	1,000/1	IRIS	July, 2007
	subchronic	1.0E-01	mg/kg/day	100%	1.0E-01	mg/kg/day	Kidney; increased kidney weight	1,000/1	Chronic	
Isopropyltoluene	chronic	ND			ND					
	subchronic	ND			ND					
Propylbenzene	chronic	4.0E-02	mg/kg/day	100%	4.0E-02	mg/kg/day			NCEA	September, 2004
	subchronic	4.0E-02	mg/kg/day	100%	4.0E-02	mg/kg/day			Chronic	
Xylenes (total)	chronic	2.0E-01	mg/kg/day	100%	2.0E-01	mg/kg/day	General toxicity; increased mortality	1,000/1	IRIS	July, 2007
	subchronic	1.0E+00	mg/kg/day	100%	1.0E+00	mg/kg/day	Nervous system; hyperactivity, decreased body weight	300	MRL	December, 2006
SEMIVOLATILES										
2-Methylnaphthalene	chronic	4.0E-03	mg/kg/day	89%	4.0E-03	mg/kg/day	Lung; pulmonary alveolar proteinosis	1,000/1	IRIS	July, 2007
	subchronic	4.0E-03	mg/kg/day	89%	4.0E-03	mg/kg/day	Lung; pulmonary alveolar proteinosis	1,000/1	Chronic	
Naphthalene	chronic	2.0E-02	mg/kg/day	89%	2.0E-02	mg/kg/day	Decreased body weight	3,000/1	IRIS	July, 2007
	subchronic	6.0E-01	mg/kg/day	89%	6.0E-01	mg/kg/day	CNS	90	MRL	December, 2006

Notes:

In accordance with OSWER 9285.7-53, chronic RfDs are identified from the following heirarchy of sources:

Tier 1:

IRIS = Integrated Risk Information System: July, 2007

Tier 2:

PPRTV = Preliminary Peer-Reviewed Toxicity Value: September, 2004 Obtained from Region IX PRG Table

April, 2007 Obtained from Region III RBC Table

Tier 3:

HEAST= Health Effects Assessment Summary Tables: FY 1997 Verified using Region IX PRG and/or Region III RBC Table

MRL = Minimum Risk Level (ATSDR: chronic MRLs): December, 2006

In addition, provisional RfDs developed by NCEA are presented for informational purposes and to be used on a case-by-case basis:

NCEA = National Center for Environmental Assessment: September, 2004 Obtained from Region IX PRG Table

April, 2007 Obtained from Region III RBC Table

Subchronic RfDs are obtained from:

- ATSDR: Intermitent MRLs
- HEAST: subchronic RfDs (from HEAST FY 1997)
- Equal to chronic RfDs when values are not published in HEAST or by ATSDR

mg = milligram

kg = kilogram

surrogate - a value for a closely related chemical is used as the RfD

BW = body weight

chronic - the chronic value is used as the subchronic RfD

ND = no data available

(1) Values obtained from RAGS Volume 1 (Part E, Supplemental Guidance for Dermal Risk Assessment, Interim Guidance) (EPA, 2004) Per this guidance, a value of 100% is used for analytes without published values.

(2) Adjusted Dermal RfD = Oral RfD x Oral to Dermal Adjustment Factor. Per RAGS Part E (USEPA, 2004), adjustments are only performed for chemicals that have an oral absorption efficiency of less than 50%.

Checked by: JHP 04/24/07

Table 3-12
Non-Cancer Toxicity Data - Inhalation

Site 04 - Potential Past Disposal Area
Lincoln, Rhode Island

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC (1)		Extrapolated RfD (1)		Primary Target Organ or System / Critical Effect	Combined Uncertainty/Modifying Factors	RfC: Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s)
VOLATILES									
1,2,4-Trimethylbenzene	chronic	6.0E-03	mg/m3	1.7E-03	mg/kg/day			PPRTV	September, 2004
	subchronic	6.0E-03	mg/m3	1.7E-03	mg/kg/day			Chronic	
1,3,5-Trimethylbenzene	chronic	6.0E-03	mg/m3	1.7E-03	mg/kg/day			PPRTV	September, 2004
	subchronic	6.0E-03	mg/m3	1.7E-03	mg/kg/day			Chronic	
Benzene	chronic	3.0E-02	mg/m3	8.6E-03	mg/kg/day	Immune system; decreased lymphocyte count	300/1	IRIS	July, 2007
	subchronic	3.0E-02	mg/m3	8.6E-03	mg/kg/day	Immune system; decreased lymphocyte count	300/1	Chronic	
Butylbenzene, n-	chronic	ND		ND					
	subchronic	ND		ND					
Isopropylbenzene	chronic	4.0E-01	mg/m3	1.1E-01	mg/kg/day	Endocrine; increased adrenal weight	1,000/1	IRIS	July, 2007
	subchronic	4.0E-01	mg/m3	1.1E-01	mg/kg/day	Endocrine; increased adrenal weight	1,000/1	Chronic	
Isopropyltoluene	chronic	ND		ND					
	subchronic	ND		ND					
Propylbenzene	chronic	ND		ND					
	subchronic	ND		ND					
Xylenes (total)	chronic	1.0E-01	mg/m3	2.9E-02	mg/kg/day	CNS; impaired motor coordination	300/1	IRIS	July, 2007
	subchronic	7.9E+00	mg/m3	2.3E+00	mg/kg/day	Nervous system	90	MRL	December, 2006
SEMIVOLATILES									
2-Methylnaphthalene	chronic	ND		ND				IRIS	July, 2007
	subchronic	ND		ND					
Naphthalene	chronic	3.0E-03	mg/m3	8.6E-04	mg/kg/day	Lung/Hyperplasia and metaplasia of epithelial cells	3,000/1	IRIS	July, 2007
	subchronic	3.0E-03	mg/m3	8.6E-04	mg/kg/day	Lung/Hyperplasia and metaplasia of epithelial cells	3,000/1	IRIS	July, 2007

Notes:

In accordance with OSWER 9285.7-53, chronic RfDs are identified from the following heirarchy of sources:

Tier 1:

IRIS = Integrated Risk Information System: July, 2007

Tier 2:

PPRTV = Preliminary Peer-Reviewed Toxicity Value: September, 2004 Obtained from Region IX PRG Table

April, 2007 Obtained from Region III RBC Table

Tier 3:

HEAST= Health Effects Assessment Summary Tables: FY 1997 Verified using Region IX PRG and/or Region III RBC Table

MRL = Minimum Risk Level (ATSDR: chronic MRLs): December, 2006

REL - CALEPA February, 2005

In addition, provisional RfDs developed by NCEA are presented for informational purposes and to be used on a case-by-case basis:

NCEA = National Center for Environmental Assessment: September, 2004 Obtained from Region IX PRG Table

April, 2007 Obtained from Region III RBC Table

mg = milligram

kg = kilogram

ug - microgram

m^3 - cubic meter

BW = body weight

Checked by: JHP 04/24/07

Subchronic RfDs are obtained from:

- ATSDR: Intermitent MRLs
- HEAST: subchronic RfDs (from HEAST FY 1997)
- Equal to chronic RfDs when values are not published in HEAST or by chronic - the chronic value is used as the subchronic RfD

TABLE 3-13
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- INDUSTRIAL/COMMERCIAL WORKER- ADUL
Site 04 - Potential Past Disposal Area
Lincoln, Rhode Island

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: INDUSTRIAL/COMMERICAL WORKER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
GROUND WATER	AIR	PLUME - INDOOR AIR	INDOOR VAPOR INHALATION	1,2,4-Trimethylbenzene	0.533	mg/l	NC		NC			5.8E-04	ug/m3	6.0E+00	ug/m3	1.E-04
				1,3,5-Trimethylbenzene	0.196	mg/l	NC		NC			2.0E-04	ug/m3	6.0E+00	ug/m3	3.E-05
				4-iso-Propyltoluene	0.0223	mg/l	NC		NC					ND		
				Benzene	0.202	mg/l	1.2E-04	ug/m3	7.8E-06	(ug/m3)-1	1.E-09	3.5E-04	ug/m3	3.0E+01	ug/m3	1.E-05
				Isopropylbenzene	0.0243	mg/l	NC		NC			5.8E-05	ug/m3	4.0E+02	ug/m3	1.E-07
				Naphthalene	0.159	mg/l	NC		NC			1.8E-05	ug/m3	3.0E+00	ug/m3	6.E-06
				n-Butylbenzene	0.0306	mg/l	NC		NC			6.6E-05	ug/m3	ND		
				Propylbenzene	0.0476	mg/l	NC		NC			9.0E-05	ug/m3	ND		
			EXPOSURE ROUTE TOTAL								1.E-09					1.E-04
		EXPOSURE POINT TOTAL									1.E-09					1.E-04
	EXPOSURE MEDIUM TOTAL										1.E-09					1.E-04
GROUNDWATER TOTAL											**1.E-09**					**1.E-04**
SOIL	SOIL	SITE	INGESTION	1,2,4-Trimethylbenzene	156	mg/kg	NC		NC			1.4E-04	mg/kg/day	5.0E-02	mg/kg/day	3.E-03
				1,3,5-Trimethylbenzene	174	mg/kg	NC		NC			1.5E-04	mg/kg/day	5.0E-02	mg/kg/day	3.E-03
				4-iso-Propyltoluene	30.7	mg/kg	NC		NC			2.7E-05	mg/kg/day	ND		
				Naphthalene	8.44	mg/kg	NC		NC			7.4E-06	mg/kg/day	2.0E-02	mg/kg/day	4.E-04
				o-Xylene	15.7	mg/kg	NC		NC			1.4E-05	mg/kg/day	2.0E-01	mg/kg/day	7.E-05
				2-Methylnaphthalene	4.68	mg/kg	NC		NC			4.1E-06	mg/kg/day	4.0E-03	mg/kg/day	1.E-03
			EXPOSURE ROUTE TOTAL								--					7.E-03
			DERMAL	1,2,4-Trimethylbenzene	156	mg/kg	NC		NC			--		5.0E-02	mg/kg/day	
				1,3,5-Trimethylbenzene	174	mg/kg	NC		NC			--		5.0E-02	mg/kg/day	
				4-iso-Propyltoluene	30.7	mg/kg	NC		NC			--		ND		
				Naphthalene	8.44	mg/kg	NC		NC			6.4E-06	mg/kg/day	2.0E-02	mg/kg/day	3.E-04
				o-Xylene	15.7	mg/kg	NC		NC			--		2.0E-01	mg/kg/day	
				2-Methylnaphthalene	4.68	mg/kg	NC		NC			3.5E-06	mg/kg/day	4.0E-03	mg/kg/day	9.E-04
												--				
												--				
			EXPOSURE ROUTE TOTAL								--					1.E-03
		EXPOSURE POINT TOTAL									0.E+00					8.E-03
	EXPOSURE MEDIUM TOTAL										0.E+00					8.E-03
	AIR	DUST AT SITE	DUST INHALATION	1,2,4-Trimethylbenzene	156	mg/kg	NC		NC			2.8E-05	ug/m3	6.0E+00	ug/m3	5.E-06
				1,3,5-Trimethylbenzene	174	mg/kg	NC		NC			3.1E-05	ug/m3	6.0E+00	ug/m3	5.E-06
				4-iso-Propyltoluene	30.7	mg/kg	NC		NC			5.4E-06	ug/m3	ND		
				Naphthalene	8.44	mg/kg	NC		NC			1.5E-06	ug/m3	3.0E+00	ug/m3	5.E-07
				o-Xylene	15.7	mg/kg	NC		NC			2.8E-06	ug/m3	1.0E+02	ug/m3	3.E-08
				2-Methylnaphthalene	4.68	mg/kg	NC		NC			8.3E-07	ug/m3	ND		
			EXPOSURE ROUTE TOTAL								--					1.E-05
		EXPOSURE POINT TOTAL									0.E+00					1.E-05
	AIR	AMBIENT VAPORS AT SITE	AMBIENT VAPOR INHALATION	1,2,4-Trimethylbenzene	156	mg/kg	NC		NC			2.3E+00	ug/m3	6.0E+00	ug/m3	4.E-01
				1,3,5-Trimethylbenzene	174	mg/kg	NC		NC			6.3E+00	ug/m3	6.0E+00	ug/m3	1.E+00
				4-iso-Propyltoluene	30.7	mg/kg	NC		NC					ND		
				Naphthalene	8.44	mg/kg	NC		NC			5.7E-02	ug/m3	3.0E+00	ug/m3	2.E-02
				o-Xylene	15.7	mg/kg	NC		NC			7.5E-01	ug/m3	1.0E+02	ug/m3	7.E-03
				2-Methylnaphthalene	4.68	mg/kg	NC		NC			3.1E-02	ug/m3	ND		
			EXPOSURE ROUTE TOTAL								--					1.E+00
		EXPOSURE POINT TOTAL									0.E+00					1.E+00
	EXPOSURE MEDIUM TOTAL										0.E+00					1.E+00
SOIL TOTAL											**0.E+00**					**1.E+00**
									TOTAL RECEPTOR RISK ACROSS ALL MEDIA		**1.E-09**	**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**				**1.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
NV - Not volatile; exposure route not complete for this chemical.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJC
Checked by: JHP

Section 4.0 Conclusions and Recommendations

This RI Report for Site 04 - PDA documents the results of the January 2006 and May-June 2007 investigations at the Site, presents the HHRA performed using the RI data, and provides recommendations to achieve Site Closure under CERCLA and Response Complete under DERP for Site 04. The conclusions and recommendations for Site 04 - PDA are presented in the following subsections.

4.1 Summary and Conclusions Site 04 - PDA

Field observations and analytical data indicate that surface and subsurface soils at the PDA have been impacted by past site activities. The presence of fuel-related and chlorinated solvent VOCs in near-surface soils above the water table indicate that the area was used at some point in the past to dispose of waste and/or raw fuels and solvents. Concentrations of naphthalene and TPH (calculated) exceed the RIDEM I/C DEC and/or GA LC in surface soils at the PDA.

Detected constituents in shallow (0-12 feet bgs) groundwater beneath the PDA are generally consistent with those found in soils at this site, primarily fuel-related and chlorinated VOCs. Benzene, naphthalene, and lead (filtered and unfiltered samples) concentrations in shallow groundwater from direct-push and monitoring well samples exceed the RIDEM GA GO. Unfiltered lead sample concentrations are likely attributable to suspended solids.

A HHRA was performed in accordance with CERCLA, the NCP, and applicable USEPA guidance to evaluate potential risks to receptors associated with the current military and reasonably foreseeable future commercial/industrial site use.. 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 4-iso-propyltoluene, naphthalene, 2-methylnaphthalene, xylenes, and petroleum hydrocarbons (DRO, GRO, VPH fractions, and EPH fractions) were retained as COPCs in soil. 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 4-iso-propyltoluene, benzene, isopropylbenzene, naphthalene, butylbenzene, and propylbenzene were retained as COPCs in groundwater.

The soil, groundwater, and combined soil and groundwater cancer risks are below the NCP risk range of $1x10^{-6}$ to $1x10^{-4}$, and the HI values do not exceed 1. This indicates that use of the Site 04 for full time industrial/commercial or military use, including full time worker contact with soil and full-time occupancy of a building subject to vapor intrusion of VOCs from shallow groundwater, is associated with health risks that do not exceed USEPA risk management criteria.

To evaluate whether a land use control is required to maintain risks within the USEPA risk management criteria, health risks associated with a hypothetical unrestricted residential land use of the Site were evaluated; the evaluation is presented in Appendix L. The results of that risk characterization indicate that cancer risks for residential land use are below the USEPA cancer risk range of 1x10-6 to 1x10-4, but the hazard index is greater than the threshold value of 1. Therefore, land use controls would be implemented when and if the U.S. Army transfers ownership of the property.

4.2 Recommendations

Based on the summary and conclusions presented above, No Action under CERCLA is appropriate for Site 04 because there are no unacceptable risks to receptors based on current or reasonably foreseeable future land use.

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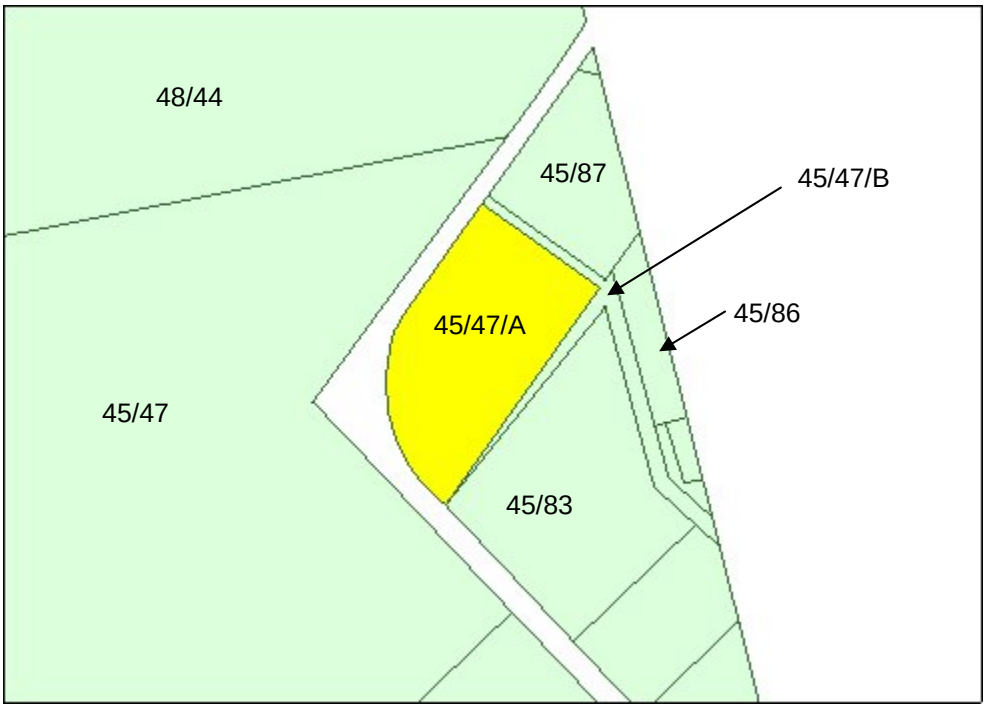
APPENDIX A

ADJACENT PROPERTIES MAPS

AMSA 68 (G)
Adjacent Properties Information

Source: Town of Smithfield Tax Assessor's On-line Database
(http://data.visionappraisal.com/SmithfieldRI/(S(q5mnhkitxi0wzx5501r0c1vn))/search.aspx)
October 10, 2006



Map/Lot/Unit	Current Owner	Prior Owner(s)	Size (acres)
45/47	State of Rhode Island	None listed	315.9
45/47/A	U S Army Reserve/94th RSC	None listed	4.0
45/47/B	Rhode Island Airport Corporation	SEC PAW Area Industrial Development Foundation	1.07
45/83	Thyssenkrupp Materials Inc.	Criterion Metals, Inc.; Madison Sandvic Co.	8.0
45/86	National Glass Service Inc.	None listed	1.5
45/87	Pure Platinum LLC	Crossley Machine & Tool Co Inc	3.21
48/44	State of Rhode Island	None listed	58.77

SOURCE:
U.S.G.S. 7.5 minute series topographic quadrangle of Pawtucket, Rhode Island

LEGEND:

- A AMSA #68
- B Madison-Sandvic Co
- C Former Lincoln Dimensional Tubing.
- D Olin Hunt
- E Former Hedison Manufacturing
- F Carol Cable Co.
- G Crownmark Corp.
- H Speidel
- I Crossley Machine and Tool

Plume No.1
Plume No.2
Plume No.3
Plume No.4
Plume No.5
400 elevation contour
stream

0 .5 1
Scale in Miles

0 .5 1
Scale in Kilometers

FIGURE 2-3
Adjacent Properties

APPENDIX B

2004 RI REPORT – TABLES 5.2 AND 5.3

Table 5.2
Summary of Soil Analytical Results
Area Maintenance Support Activity Facility, AMSA 68, Lincoln, Rhode Island

	AOC/SOURCE 1		AOC/SOURCE 2							RIDEM Method 1 Soil Standards		
Sample ID	TP-3G	MW-10-20-21'	MW-6B-2-4'	MW-6D	MW-6D(24.5)	MW-6S-2-4'	MW-7-3-4'	NSB-2-3-4'	TP-6G	Residential	Industrial/Commercial	GB
Depth	6-8'	20 - 21'	2-4'	8-10'	24.5	2-4'	3-4'	3-4'	3-5'	Direct Exposure Criteria	Direct Exposure Criteria	Leachability Criteria
Date Sampled	3/18/03	3/21/03	3/17/03	3/18/03	3/18/03	3/19/03	3/19/03	3/20/03	3/19/03	(mg/Kg)		(mg/Kg)
Method/Analyte												
Volatile Organic Compounds (VOCs) - (mg/Kg)												
Trichlorofluoromethane	<0.044	<0.065	0.051 J	<0.110	<0.062	<0.080	<0.060	<0.065	<0.059	NL	NL	NL
Methylene chloride	<0.044	<0.065	<0.086	<0.110	<0.062	<0.080	<0.060	<0.065	<0.059	45	760	NL
Methyl tert-butyl ether	0.018 J	0.034	<0.043	<0.053	<0.031	<0.040	<0.030	0.038	0.027 J	390	10,000	100
Tetrahydrofuran	<0.220	<0.320	<0.430	<0.530	<0.310	<0.400	<0.300	<0.320	<0.300	NL	NL	NL
Benzene	<0.022	0.640	<0.043	<0.053	<0.031	<0.040	<0.030	<0.032	<0.030	2.5	200	4.3
Trichloroethene	<0.022	<0.032	<0.043	<0.053	0.016 J	<0.040	<0.030	<0.032	<0.030	13	520	4.2
Toluene	0.011 J	1.200 J[1]	<0.043	<0.053	<0.031	<0.040	<0.030	<0.032	<0.030	190	10,000	54
Tetrachloroethene	<0.022	<0.032	<0.043	<0.053	0.020 J	<0.040	<0.030	<0.032	<0.030	12	110	4.2
Ethylbenzene	0.026	0.160	<0.043	<0.053	<0.031	<0.040	<0.030	<0.032	<0.030	71	10,000	62
m,p-Xylene	0.081	0.390	<0.043	<0.053	<0.031	<0.040	<0.030	<0.032	<0.030	110[1]	10000[1]	NL
o-Xylene	0.032	0.130	<0.043	<0.053	<0.031	<0.040	<0.030	<0.032	<0.030	110[1]	10000[1]	NL
Isopropylbenzene	<0.022	<0.032	<0.043	<0.053	<0.031	<0.040	<0.030	<0.032	<0.030	27	10,000	NL
n-Propylbenzene	0.042	<0.032	<0.043	<0.053	<0.031	<0.040	<0.030	<0.032	<0.030	NL	NL	NL
1,3,5-Trimethylbenzene	0.093 J	0.029 J	<0.043	<0.053	<0.031	<0.040	<0.030	<0.032	<0.030	NL	NL	NL
tert-Butylbenzene	<0.022	<0.032	<0.043	<0.053	<0.031	<0.040	<0.030	<0.032	<0.030	NL	NL	NL
1,2,4-Trimethylbenzene	0.290 J	0.095	<0.043	<0.053	<0.031	<0.040	<0.030	<0.032	<0.030	NL	NL	NL
sec-Butylbenzene	0.012 J	<0.032	<0.043	<0.053	<0.031	<0.040	<0.030	<0.032	<0.030	NL	NL	NL
4-Isopropyltoluene	<0.022	<0.032	<0.043	<0.053	<0.031	<0.040	<0.030	<0.032	<0.030	NL	NL	NL
Naphthalene	0.057 J	<0.065	<0.086	<0.110	0.056 J	<0.080	<0.060	<0.065	<0.059	54	10,000	NL
Semi-volatile Organic Compounds (SVOCs) - (mg/Kg)												
Naphthalene	<0.260	<0.290	<0.320	<0.350	<0.300	<0.320	<0.300	<0.290	<0.300	54	10,000	NL
2-Methylnaphthalene	<0.260	<0.290	<0.320	<0.350	<0.300	<0.320	<0.300	<0.290	<0.300	123	10,000	NL
Phenanthrene	0.310	<0.290	<0.320	<0.350	<0.300	<0.320	<0.300	<0.290	<0.300	40	10,000	NL
Anthracene	0.060 J	<0.290	<0.320	<0.350	<0.300	<0.320	<0.300	<0.290	<0.300	35	10,000	NL
Fluoranthene	0.540	<0.290	<0.320	<0.350	<0.300	<0.320	<0.300	<0.290	<0.300	20	10,000	NL
Pyrene	0.460	<0.290	<0.320	<0.350	<0.300	<0.320	<0.300	<0.290	<0.300	13	10,000	NL
Benz(a)anthracene	0.250 J	<0.290	<0.320	<0.350	<0.300	<0.320	<0.300	<0.290	<0.300	0.9	7.8	NL
Chrysene	0.270	<0.290	<0.320	<0.350	<0.300	<0.320	<0.300	<0.290	<0.300	0.4	780	NL
Di-n-octyl phthalate	<0.260	<0.290	<0.320	<0.350	<0.300	<0.320	<0.300	<0.290	<0.300	NL	NL	NL
Benzo(b)fluoranthene	0.300	<0.290	<0.320	<0.350	<0.300	<0.320	<0.300	<0.290	<0.300	0.9	7.8	NL
Benzo(k)fluoranthene	0.150 J	<0.290	<0.320	<0.350	<0.300	<0.320	<0.300	<0.290	<0.300	0.9	78	NL
Benzo(a)pyrene	0.240 J	<0.290	<0.320	<0.350	<0.300	<0.320	<0.300	<0.290	<0.300	0.4	0.8	NL
Indeno(1,2,3-cd)pyrene	0.180 J	<0.290	<0.320	<0.350	<0.300	<0.320	<0.300	<0.290	<0.300	0.9	7.8	NL
Bis(2-ethylhexyl)phthalate	<0.260	0.089 J	<0.320	<0.350	0.160 J	<0.320	<0.300	<0.290	<0.300	46	410	NL
Benzo(g,h,i)perylene	0.180 J	<0.290	<0.320	<0.350	<0.300	<0.320	<0.300	<0.290	<0.300	0.8	10,000	NL
Metals (mg/Kg)												
Barium	22 J	25 J	22 J	21 J	15 J	23 J	35	20 J	25 J	5,500	10,000	NL
Cadmium	0.45 J	<0.73	<0.75	<0.083	<0.76	<0.77	<0.74	<0.71	<0.74	39	1,000	NL
Chromium	9.1	3.0	5.1	6.0	16	5.6	9.1	5.6	6.4	1,400 / 390[3]	10,000/10,000[3]	NL
Silver	<1.8	0.56 J	<2.1	0.34 J	<2.1	<2.2	<2.1	0.58 J	<2.1	200	10,000	NL
Lead	13	2.6 J	8.8	4.5	10	5.5	3.1 J	4.5	3.4 J	150	500	NL
Selenium	3.0 J	<12	<12	5.7 J	<12	<12	<12	<11	<12	390	10,000	NL
Total Petroleum Hydrocarbons (TPH) - (mg/Kg)												
TPH	4.9	5.2 J	0	0	0	0	0	0	0			
Gasoline Range Organics (8260B)	4.9	5.2 J	<4.3	<5.3	<3.1	<4.0	<3.0	<3.3 UJ	<3.0			
Gasoline (8015B)	<53	<58	<64	<70	<59	<62	<61	<58	<61			
Mineral Spirits	<53	<58	<64	<70	<59	<62	<61	<58	<61			
Kerosene	<53	<58	<64	<70	<59	<62	<61	<58	<61	500	2,500	2,500
Diesel Fuel/Fuel Oil #2	<53	<58	<64	<70	<59	<62	<61	<58	<61			
Motor Oil/Hydraulic Oil	<110	<120	<130	<140	<120	<120	<120	<120	<120			
Unidentified Hydrocarbons	<110	<120	<130	<140	<120	<120	<120	<120	<120			
Pesticides (mg/Kg)												
alpha-BHC	<0.00085	<0.00092	<0.0010	<0.0011	<0.00095	<0.0010	<0.00095	<0.00093	<0.00097	NL	NL	NL
4,4'-DDD	<0.0017	<0.0018	0.0020 J	<0.0023	<0.0019	<0.0021	<0.0019	<0.0019	<0.0019	NL	NL	NL
4,4'-DDT	0.0015 J	<0.0018	0.0010 J	0.0013 J	<0.0019	<0.0021	<0.0019	<0.0019	<0.0019	NL	NL	NL
PCBs - (mg/Kg)												
Aroclor 1254	<0.026	<0.029	<0.031	<0.035	<0.030	<0.032	<0.030	<0.029	<0.030	10[3]	10[3]	10.0[3]
Aroclor 1260	<0.026	<0.029	<0.031	<0.035	<0.030	<0.032	<0.030	<0.029	<0.030	10[3]	10[3]	10.0[3]

Relative Percent Difference (RPD) Values for duplicate samples are +/-50% difference for all parameters in soil and '+/-30% for all parameters in groundwater.

NOTES:

J[1] = Estimate (J/UJ) the positive and non-detect results for Trichloroethane and Toluene due to MS/MSD exceedances.
J[2] = Estimate (J/UJ) the positive and non-detect results for gasoline range organics due to MS %REC exceedance of QC limit
J[3] = Estimate (J/UJ) the positive and non-detect results for toluene, 1,2,4-Trimethylbenzene, 1,3,5-Trimethylbenzene, Naphthalene and Trichloroethene due to MS/MSD exceedances.
J[4] = Estimate (J/UJ) the positive and non-detect results for methylene chloride due to trip blank contamination at a concentration below the action level.
J[5] = Estimate (J/UJ) the positive and non-detect results for tetrahydrofuran and Aroclor 1260 due to MS/MSD %RPD exceedances.
J[6] = Estimate (J/UJ) the positive and non-detect results for tetrahydrofuran due to LCS %REC outside QC limits.
1. = Standard is for total xylene concentration.
2. = Standard shows hexavalent chromium/trivalent chromium standard.
3. = Standard is for total PCB concentration.
Results shown in **bold** indicate that concentration exceeds Method 1 Industrial/Commercial Direct Exposure Criteria
Results shown in *italics* indicate that concentration exceeds Method 1 Residential Direct Exposure Criteria.

Table 5.2
Summary of Soil Analytical Results
Area Maintenance Support Activity Facility, AMSA 68, Lincoln, Rhode Island

Sample ID	AOC/SOURCE 3 & 5				AOC/SOURCE	AOC/SOURCE 6			RIDEM Method 1 Soil Standards		
Depth	MW-9-8-10'	DUP-02	NSB-3-6-8'	NSB-4-20-22'	TP-1C	TP-4G	TP-5G	MW-13-6-8'	Residential	Industrial/Commercial	GB
Date Sampled	8 - 10' 3/21/03	8-10' 3/21/03	6 - 8' 3/20/03	20-22' 3/25/03	5-6' & 8' 3/18/03	4-6' 3/18/03	3-5' 3/19/03	6-8' 3/25/03	Direct Exposure Criteria (mg/Kg)	Direct Exposure Criteria	Leachability Criteria (mg/Kg)
Method/Analyte											
Volatile Organic Compounds (VOCs) - (mg/Kg)											
Trichlorofluoromethane	0.050 J	<0.063	<3.900	<0.059	<0.059	<0.056	<0.050	<0.050	NL	NL	NL
Methylene chloride	<0.051	<0.063	<3.900	<0.059	<0.059	<0.056	0.027 J	<0.050	45	760	NL
Methyl tert-butyl ether	0.027	<0.031	<2.000	<0.029	<0.030	0.028 J	0.028 J	<0.025	390	10,000	100
Tetrahydrofuran	<0.260	<0.310	<20.000	0.630 J[6]	<0.300	<0.280	<0.250	<0.250	NL	NL	NL
Benzene	0.022 J	<0.031	<2.000	<0.029	<0.030	<0.028	<0.025	<0.025	2.5	200	4.3
Trichloroethene	<0.026	<0.031	<2.000	<0.029	<0.030	<0.028	<0.025	<0.025	13	520	4.2
Toluene	0.025 J[7]	<0.031	95.000 J	0.045	<0.030	<0.028	<0.025	<0.025	190	10,000	54
Tetrachloroethene	<0.026	<0.031	<2.000	<0.029	<0.030	<0.028	<0.025	<0.025	12	110	4.2
Ethylbenzene	0.028	0.025 J	42.000	<0.029	<0.030	<0.028	<0.025	<0.025	71	10,000	62
m,p-Xylene	0.041	0.022 J	*150.00*	0.016 J	<0.030	<0.028	<0.025	<0.025	110[1]	10000[1]	NL
o-Xylene	<0.026	<0.031	55.000	<0.029	<0.030	<0.028	<0.025	<0.025	110[1]	10000[1]	NL
Isopropylbenzene	<0.026	<0.031	4.000	<0.029	<0.030	<0.028	<0.025	<0.025	27	10,000	NL
n-Propylbenzene	<0.026	<0.031	15.000	<0.029	<0.030	<0.028	<0.025	<0.025	NL	NL	NL
1,3,5-Trimethylbenzene	0.022 J	<0.031	28.000	<0.029	<0.030	<0.028	<0.025	<0.025	NL	NL	NL
tert-Butylbenzene	<0.026	<0.031	2.000	<0.029	<0.030	<0.028	<0.025	<0.025	NL	NL	NL
1,2,4-Trimethylbenzene	0.058	0.043	89.000	<0.029	<0.030	<0.028	<0.025	<0.025	NL	NL	NL
sec-Butylbenzene	<0.026	<0.031	2.200	<0.029	<0.030	<0.028	<0.025	<0.025	NL	NL	NL
4-Isopropyltoluene	<0.026	<0.031	1.000 J	<0.029	<0.030	<0.028	<0.025	<0.025	NL	NL	NL
Naphthalene	<0.051	<0.063	11.000	<0.059	<0.059	<0.056	<0.050	<0.050	54	10,000	NL
Semi-volatile Organic Compounds (SVOCs) - (mg/Kg)											
Naphthalene	<0.280	<0.280	3.600	<0.280	<0.290	<0.270	<0.260	<0.280	54	10,000	NL
2-Methylnaphthalene	<0.280	<0.280	3.500	<0.280	<0.290	<0.270	<0.260	<0.280	123	10,000	NL
Phenanthrene	<0.280	<0.280	0.080 J	<0.280	<0.290	<0.270	<0.260	<0.280	40	10,000	NL
Anthracene	<0.280	<0.280	<0.270	<0.280	<0.290	<0.270	<0.260	<0.280	35	10,000	NL
Fluoranthene	<0.280	<0.280	<0.270	<0.280	0.070 J	<0.270	<0.260	<0.280	20	10,000	NL
Pyrene	<0.280	<0.280	<0.270	<0.280	<0.290	<0.270	<0.260	<0.280	13	10,000	NL
Benz(a)anthracene	<0.280	<0.280	<0.270	<0.280	<0.290	<0.270	<0.260	<0.280	0.9	7.8	NL
Chrysene	<0.280	<0.280	<0.270	<0.280	<0.290	<0.270	<0.260	<0.280	0.4	780	NL
Di-n-octyl phthalate	<0.280	<0.280	0.130 J	<0.280	<0.290	<0.270	<0.260	<0.280	NL	NL	NL
Benzo(b)fluoranthene	<0.280	<0.280	<0.270	<0.280	<0.290	<0.270	<0.260	<0.280	0.9	7.8	NL
Benzo(k)fluoranthene	<0.280	<0.280	<0.270	<0.280	<0.290	<0.270	<0.260	<0.280	0.9	78	NL
Benzo(a)pyrene	<0.280	<0.280	<0.270	<0.280	<0.290	<0.270	<0.260	<0.280	0.4	0.8	NL
Indeno(1,2,3-cd)pyrene	<0.280	<0.280	<0.270	<0.280	<0.290	<0.270	<0.260	<0.280	0.9	7.8	NL
Bis(2-ethylhexyl)phthalate	<0.280	<0.280	0.078 J	<0.280	<0.290	0.085 J	<0.260	<0.280	46	410	NL
Benzo(g,h,i)perylene	<0.280	<0.280	<0.270	<0.280	<0.290	<0.270	<0.260	<0.280	0.8	10,000	NL
Metals (mg/Kg)											
Barium	18 J	24 J	24 J	29	18 J	24 J	24 J	43 J	5,500	10,000	NL
Cadmium	<0.70	<0.71	<0.65	<0.67	<0.69	<0.69	<0.65	<0.67	39	1,000	NL
Chromium	2.9	3.3	6.9	4.2	5.6	5.3	3.0	4.2	1,400 / 390[3]	10,000/10,000[3]	NL
Silver	0.44 J	0.58 J	0.47 J	<1.9	<1.9	0.31 J	<1.8	<1.9	200	10,000	NL
Lead	2.1 J	2.5 J	3.8	4.0	4.5	<3.4	3.1 J	3.6	150	500	NL
Selenium	<11	<11	<10	<11	<11	2.9 J	4.5 J	4.2 J	390	10,000	NL
Total Petroleum Hydrocarbons (TPH) - (mg/Kg)											
TPH	0	3.0 J	**3,760 J**	0	0	0	0	0	500	2,500	2,500
Gasoline Range Organics (8260B)	<2.5 UJ	3.0 J	**3,400 J**	<2.9	<3.0	<2.8	<2.5	<2.5			
Gasoline (8015B)	<55	<57	360	<56	<57	<56	<52	<56			
Mineral Spirits	<55	<57	<54	<56	<57	<56	<52	<56			
Kerosene	<55	<57	<54	<56	<57	<56	<52	<56			
Diesel Fuel/Fuel Oil #2	<55	<57	<54	<56	<57	<56	<52	<56			
Motor Oil/Hydraulic Oil	<110	<110	<110	<110	<110	<110	<100	<110			
Unidentified Hydrocarbons	<110	<110	<110	<110	<110	<110	<100	<110			
Pesticides (mg/Kg)											
alpha-BHC	<0.00089	<0.00090	<0.00087	<0.00091	<0.00092	<0.00090	<0.00086	<0.00089	NL	NL	NL
4,4'-DDD	<0.0018	<0.0018	<0.0017	<0.0018	<0.0018	<0.0018	<0.0017	<0.0018	NL	NL	NL
4,4'-DDT	<0.0018	<0.0018	0.0013 J	<0.0018	0.0015 J	<0.0018	<0.0017	<0.0018	NL	NL	NL
PCBs - (mg/Kg)											
Aroclor 1254	<0.028	<0.028	<0.027	<0.029 UJ	<0.029	<0.028	<0.027	<0.028 UJ	10[3]	10[3]	10.0[3]
Aroclor 1260	<0.028	<0.028	<0.027	<0.029 UJ	<0.029	<0.028	<0.027	<0.028 UJ	10[3]	10[3]	10.0[3]

Relative Percent Difference (RPD) Values for duplicate samples are +/-50% difference for all parameters in soil and '+/-30% for all parameters in groundwater.

NOTES:

J[1] = Estimate (J/UJ) the positive and non-detect results for Trichloroethane and Toluene due to MS/MSD exceedances.
J[2] = Estimate (J/UJ) the positive and non-detect results for gasoline range organics due to MS %REC exceedance of QC limit
J[3] = Estimate (J/UJ) the positive and non-detect results for toluene, 1,2,4-Trimethylbenzene, 1,3,5-Trimethylbenzene, Naphthalene and Trichloroethene due to MS/MSD exceedances.
J[4] = Estimate (J/UJ) the positive and non-detect results for methylene chloride due to trip blank contamination at a concentration below the action level.
J[5] = Estimate (J/UJ) the positive and non-detect results for tetrahydrofuran and Aroclor 1260 due to MS/MSD %RPD exceedances.
J[6] = Estimate (J/UJ) the positive and non-detect results for tetrahydrofuran due to LCS %REC outside QC limits.
1. = Standard is for total xylene concentration.
2. = Standard shows hexavalent chromium/trivalent chromium standard.
3. = Standard is for total PCB concentration.
Results shown in **bold** indicate that concentration exceeds Method 1 Industrial/Commercial Direct Exposure Criteria
Results shown in *italics* indicate that concentration exceeds Method 1 Residential Direct Exposure Criteria.

Table 5.2
Summary of Soil Analytical Results
Area Maintenance Support Activity Facility, AMSA 68, Lincoln, Rhode Island

Sample ID	TP-2G	DUP-1	TP-7G	NSB-1-2-4'	MW-8-6-8'	MW-8-20-21'	MW-11-2-4'	MW-12-5-7'	RIDEM Method 1 Soil Standards		
	AOC/SOURCE 10						AOC/SOURCE 13				
Depth	2.5-3'	2.5-3'	1-1.5'	2-4'	6 - 8'	20 - 21'	2-4'	5-7'	Residential Direct Exposure Criteria (mg/Kg)	Industrial/Commercial Direct Exposure Criteria	GB Leachability Criteria (mg/Kg)
Date Sampled	3/18/03	3/18/03	3/19/03	3/19/03	3/20/03	3/20/03	3/24/03	3/24/03			
Method/Analyte											
Volatile Organic Compounds (VOCs) - (mg/Kg)											
Trichlorofluoromethane	<0.550	<0.520	<0.064	0.035 J	<0.058	<0.057	0.048 J	<0.060	NL	NL	NL
Methylene chloride	<0.550	<0.520	<0.064	<0.068	<0.058	<0.057	<0.066	<0.060	45	760	NL
Methyl tert-butyl ether	<0.280	<0.260	0.030 J	0.034 J	0.033	0.029	0.032 J	<0.030	390	10,000	100
Tetrahydrofuran	<2.800	<2.600	<0.320	<0.340	<0.290	<0.280	<0.330	<0.300	NL	NL	NL
Benzene	<0.280	<0.260	<0.032	<0.034	<0.029	0.027 J	<0.033	<0.030	2.5	200	4.3
Trichloroethene	<0.280	<0.260	<0.032	<0.034	<0.029	<0.028	<0.033	<0.030	13	520	4.2
Toluene	<0.280	<0.260	0.035 J[3]	<0.034	<0.029	<0.028	<0.033	<0.030	190	10,000	54
Tetrachloroethene	<0.280	<0.260	<0.032	<0.034	<0.029	<0.028	<0.033	<0.030	12	110	4.2
Ethylbenzene	<0.280	<0.260	0.140	<0.034	<0.029	<0.028	<0.033	<0.030	71	10,000	62
m,p-Xylene	0.510	0.750	0.710	<0.034	<0.029	<0.028	<0.033	<0.030	110[1]	10000[1]	NL
o-Xylene	<0.280	<0.260	0.490	<0.034	<0.029	<0.028	<0.033	<0.030	110[1]	10000[1]	NL
Isopropylbenzene	1.500	1.800	0.350	<0.034	<0.029	<0.028	<0.033	<0.030	27	10,000	NL
n-Propylbenzene	4.800	6.000	1.200	<0.034	<0.029	<0.028	<0.033	<0.030	NL	NL	NL
1,3,5-Trimethylbenzene	19.000 J	24.000 J	5.500 J[3]	<0.034	<0.029	<0.028	<0.033	<0.030	NL	NL	NL
tert-Butylbenzene	<0.280	<0.260	0.140	<0.034	<0.029	<0.028	<0.033	<0.030	NL	NL	NL
1,2,4-Trimethylbenzene	63.000 J	77.000 J	14.00 J[3]	<0.034	0.026 J	<0.028	<0.033	<0.030	NL	NL	NL
sec-Butylbenzene	2.300 J	2.900 J	0.710 J	<0.034	<0.029	<0.028	<0.033	<0.030	NL	NL	NL
4-Isopropyltoluene	3.900 J	4.800	1.400 J	<0.034	<0.029	<0.028	<0.033	<0.030	NL	NL	NL
Naphthalene	0.980 J	1.100 J	2.500 J[3]	<0.068	<0.058	<0.057	<0.066	<0.060	54	10,000	NL
Semi-volatile Organic Compounds (SVOCs) - (mg/Kg)											
Naphthalene	<0.570	0.480	1.900	<0.320	<0.280		<0.320	<0.270	54	10,000	NL
2-Methylnaphthalene	0.350	0.300	1.600	<0.320	<0.280		<0.320	<0.270	123	10,000	NL
Phenanthrene	<0.300	<0.300	0.450	<0.320	<0.280		<0.320	<0.270	40	10,000	NL
Anthracene	<0.300	<0.300	0.071 J	<0.320	<0.280		<0.320	<0.270	35	10,000	NL
Fluoranthene	<0.300	<0.300	0.650	0.066 J	<0.280		<0.320	<0.270	20	10,000	NL
Pyrene	<0.300	<0.300	0.600	<0.320	<0.280		<0.320	<0.270	13	10,000	NL
Benz(a)anthracene	<0.300	<0.300	0.270 J	<0.320	<0.280		<0.320	<0.270	0.9	7.8	NL
Chrysene	<0.300	<0.300	0.370	<0.320	<0.280		<0.320	<0.270	0.4	780	NL
Di-n-octyl phthalate	<0.300	<0.300	<0.340	<0.320	<0.280		<0.320	<0.270	NL	NL	NL
Benzo(b)fluoranthene	<0.300	<0.300	0.530	<0.320	<0.280		<0.320	<0.270	0.9	7.8	NL
Benzo(k)fluoranthene	<0.300	<0.300	0.170 J	<0.320	<0.280		<0.320	<0.270	0.9	78	NL
Benzo(a)pyrene	<0.300	<0.300	0.350	<0.320	<0.280		<0.320	<0.270	0.4	0.8	NL
Indeno(1,2,3-cd)pyrene	<0.300	<0.300	0.270 J	<0.320	<0.280		<0.320	<0.270	0.9	7.8	NL
Bis(2-ethylhexyl)phthalate	<0.300	0.062 J	0.290 J	<0.320	<0.280		<0.320	<0.270	46	410	NL
Benzo(g,h,i)perylene	<0.300	<0.300	0.300 J	<0.320	<0.280		<0.320	<0.270	0.8	10,000	NL
Metals (mg/Kg)											
Barium	21 J	23 J	23 J	23 J	39		23 J	26 J	5,500	10,000	NL
Cadmium	<0.74	<0.72	1.2	<0.77	<0.66		<0.75	<0.70	39	1,000	NL
Chromium	6.7	6.2	7.1	8.3	2.9		6.0	2.1	1,400 / 390[3]	10,000/10,000[3]	NL
Silver	<2.1	<2.0	<2.2	0.68 J	0.53 J		<2.1	<2.0	200	10,000	NL
Lead	3.7 J	2.7 J	45	17	6.0		7.7	2.6 J	150	500	NL
Selenium	<12	<12	<13	<12	<11		4.7 J	5.2 J	390	10,000	NL
Total Petroleum Hydrocarbons (TPH) - (mg/Kg)											
TPH	*1,300*	*1,620*	*910*	0	0		0	0			
Gasoline Range Organics (8260B)	*1,300*	*1,300*	*340*	<3.4 UJ	<2.9 UJ		<3.3	<3.0			
Gasoline (8015B)	<62	<59	<67	<64	<55		<61	<54			
Mineral Spirits	<62	<59	<67	<64	<55		<61	<54	500	2,500	2,500
Kerosene	<62	<59	<67	<64	<55		<61	<54			
Diesel Fuel/Fuel Oil #2	<62	<59	<67	<64	<55		<61	<54			
Motor Oil/Hydraulic Oil	<120	<120	*410*	<130	<110		<120	<110			
Unidentified Hydrocarbons	<120	320	*160*	<130	<110		<120	<110			
Pesticides (mg/Kg)											
alpha-BHC	0.002	<0.00095	<0.0011	<0.0010	<.00088		<0.00099	<0.00089	NL	NL	NL
4,4'-DDD	<0.0019	<0.0019	<0.0022	<0.0020	<0.0018		<0.002	<0.0018	NL	NL	NL
4,4'-DDT	<0.0019	<0.0019	<0.0022	<0.0020	<0.0018		<0.002	<0.0018	NL	NL	NL
PCBs - (mg/Kg)											
Aroclor 1254	<0.030	<0.030	0.530	<0.031	<0.027		<0.028 UJ	<0.028 UJ	10[3]	10[3]	10.0[3]
Aroclor 1260	<0.030	<0.030	0.800	<0.031	<0.027		<0.028 UJ	<0.028 UJ	10[3]	10[3]	10.0[3]

Relative Percent Difference (RPD) Values for duplicate samples are +/-50% difference for all parameters in soil and '+/-30% for all parameters in groundwater.

NOTES:

J[1] = Estimate (J/UJ) the positive and non-detect results for Trichloroethane and Toluene due to MS/MSD exceedances.
J[2] = Estimate (J/UJ) the positive and non-detect results for gasoline range organics due to MS %REC exceedance of QC limit
J[3] = Estimate (J/UJ) the positive and non-detect results for toluene, 1,2,4-Trimethylbenzene, 1,3,5-Trimethylbenzene, Naphthalene and Trichloroethene due to MS/MSD exceedances.
J[4] = Estimate (J/UJ) the positive and non-detect results for methylene chloride due to trip blank contamination at a concentration below the action level.
J[5] = Estimate (J/UJ) the positive and non-detect results for tetrahydrofuran and Aroclor 1260 due to MS/MSD %RPD exceedances.
J[6] = Estimate (J/UJ) the positive and non-detect results for tetrahydrofuran due to LCS %REC outside QC limits.
1. = Standard is for total xylene concentration.
2. = Standard shows hexavalent chromium/trivalent chromium standard.
3. = Standard is for total PCB concentration.
Results shown in **bold** indicate that concentration exceeds Method 1 Industrial/Commercial Direct Exposure Criteria
Results shown in *italics* indicate that concentration exceeds Method 1 Residential Direct Exposure Criteria.

Table 5.3
Summary of Groundwater Analytical Results
Area Maintenance Support Activity Facility, AMSA 68, Lincoln, Rhode Island

	AOC/SOURCE 1	AOC/SOURCE 2							AOC/SOURCES 3&5	RIDEM GB Groundwater Objective (ug/L)
Analyte (units)	MW-10	MW-3	DUP-1	MW-6S	MW-6D	MW-6B	MW-7	EW-1	MW-9	
Volatile Organic Compounds (VOCs) - (ug/L - ppb)										
Chloroethane	2.9 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	NL
Acetone	420	<10	<10	<10	<10	<10	19	<10	8.0 J	NL
Methylene chloride	<5.0 UJ[2]	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0 UJ[2]	NL
1,1-Dichloroethane	<2.0	<2.0	<2.0	2.1	1.6 J	2.2	<1.0	3.1	<2.0	NL
2-Butanone	43	<10	<10	<10	<10	<10	<10	<10	<10	NL
cis-1,2-Dichloroethene	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2,400
Chloroform	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NL
1,1,1- Trichloroethane	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	3,100
Benzene	**3,500**	<1.0	<1.0	<1.0	<1.0	0.86 J	<1.0	<1.0	14	140
Trichloroethene	<2.0	<2.0	<2.0	<2.0	0.69 J	<2.0	<2.0	<2.0	<2.0	540
4-Methyl-2-pentanone	<10	<10	<10	<10	<10	<10	<10	<10	<10	NL
Toluene	**5,500**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	34	1,700
Ethylbenzene	460	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	23	1,600
m,p-Xylene	950	<2.0	<2.0	<2.0	<2.0	0.78 J	<2.0	<2.0	30	NL
o-Xylene	350	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	12	NL
Isopropylbenzene	10	<1.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	1.9 J	NL
1,2,3-Trichloropropane	2.6	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NL
n-Propylbenzene	22	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	5.8	NL
1,3,5-Trimethylbenzene	27	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	9.2	NL
1,2,4-Trimethylbenzene	160	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	26	NL
sec-Butylbenzene	0.68 J	<2.0	<2.0	<2.0	0.88 J	<2.0	<2.0	<2.0	0.77 J	NL
4-Isopropyltoluene	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	0.84 J	NL
1,4-Dichlorobenzene	<2.0	<2.0	<2.0	<2.0	0.57 J	<2.0	<2.0	<2.0	<2.0	NL
1,2,4-Trichlorobenzene	<2.0	<2.0	<2.0	<2.0	0.66 J	<2.0	<2.0	<2.0	<2.0	NL
Naphthalene	54	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	4.0 J	NL
Semi-volatile Organic Compounds (SVOCs) - (ug/L - ppb)										
2-Methylphenol	11	<10	<10	<10	<10	<10	4.5 J	<10	<10	NL
4-Methylphenol	15	<10	<10	<10	<10	<10	1.4 J	<10	<10	NL
Benzoic Acid	<20	<20	<20	<20	<20	<20	26	<20	<20	NL
Naphthalene	49	<10	<10	<10	<10	<10	<10	<10	<10	NL
Dimethyl phthalate	<10	<10	<10	<10	<10	1.0 J	<10	<10	<10	NL
Di-n-butyl phthalate	<10	<10	<10	<10	<10	1.6 J	<10	<10	<10	NL
Bis(2-ethylhexyl)phthalate	<10	<10	<10	<10	<10	<10	<10	<10	<10	NL
Metals (ug/L -ppb)										
Arsenic	2.6 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	NL
Barium	59 J	<200	<200	<200	<200	<200	<200	<200	65 J	NL
Pesticides (ug/L -ppb)										
gamma-BHC	<0.0064	<0.0064 UJ[1]	<0.0064 UJ[1]	<0.0064 UJ[1]	<0.0064 UJ[1]	0.019	<0.0064 UJ[1]	<0.0064 UJ[1]	<0.0064	NL

Relative Percent Difference (RPD) Values for duplicate samples are +/-50% difference for all parameters in soil and '+/-30% for all parameters in groundwater.

NOTES:

UJ[1] = Estimate (J/UJ) the positive and non-detect results for gamma-BHC due to MS/MSD %RPD exceedances.

UJ[2] = Estimate (J/UJ) the positive and non-detect results for methylene chloride due to contamination detected in the Trip Blank.

Results shown in bold indicate that concentration exceeds GB Groundwater Objective.
Results shown in italics indicate that concentration exceeds Method 1 Residential Direct Exposure Criteria.

Table 5.3
Summary of Groundwater Analytical Results
Area Maintenance Support Activity Facility, AMSA 68, Lincoln, Rhode Island

	AOC/SOURCE 6	AOC/SOURCE 10				AOC/SOURCE 13			General		RIDEM GB Groundwater Objective (ug/L)
Analyte (units)	**MW-13**	**MW-1**	**MW-2**	**MW-8**	**DUP-2**	**MW-4**	**MW-11**	**MW-12**	**MW-5**	**EW-3**	
Volatile Organic Compounds (VOCs) - (ug/L - ppb)											
Chloroethane	<5.0	<5.0	<5.0	2.3 J	2.4 J	<5.0	<5.0	<5.0	<5.0	<5.0	NL
Acetone	<10	<10	<10	57	54	<10	<10	<10	<10	<10	NL
Methylene chloride	<5.0	<5.0 UJ[2]	<5.0 J[2]	1.3 J[2]	<5.0 UJ[2]	<5.0	<5.0	<5.0	<5.0 UJ[2]	<5.0	NL
1,1-Dichloroethane	<2.0	<2.0	<2.0	0.64 J	0.63 J	2.5	<2.0	<2.0	<2.0	<2.0	NL
2-Butanone	<10	<10	<10	4.1 J	4.5 J	<10	<10	<10	<10	<10	NL
cis-1,2-Dichloroethene	<2.0	<2.0	<2.0	1.2 J	1.2 J	<2.0	<2.0	<2.0	<2.0	<2.0	2,400
Chloroform	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	0.53 J	<2.0	<2.0	<2.0	NL
1,1,1- Trichloroethane	<2.0	<2.0	<2.0	<2.0	<2.0	1.8 J	<2.0	<2.0	<2.0	<2.0	3,100
Benzene	<1.0	<1.0	<1.0	**340**	**560**	<1.0	<1.0	<1.0	<1.0	<1.0	140
Trichloroethene	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	540
4-Methyl-2-pentanone	<10	<10	<10	<10	2.8 J	<10	<10	<10	<10	<10	NL
Toluene	<2.0	<2.0	<2.0	260	250	<2.0	<2.0	<2.0	<2.0	<2.0	1,700
Ethylbenzene	<2.0	<2.0	<2.0	37	35	<2.0	<2.0	<2.0	<2.0	<2.0	1,600
m,p-Xylene	<2.0	<2.0	<2.0	82	74	<2.0	<2.0	0.85 J	<2.0	0.97 J	NL
o-Xylene	<2.0	<2.0	<2.0	30	29	<2.0	<2.0	<2.0	<2.0	<2.0	NL
Isopropylbenzene	<2.0	<2.0	<2.0	1.2 J	1.3 J	<2.0	<2.0	<2.0	<2.0	<2.0	NL
1,2,3-Trichloropropane	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NL
n-Propylbenzene	<2.0	<2.0	<2.0	2.5	2.3	<2.0	<2.0	<2.0	<2.0	<2.0	NL
1,3,5-Trimethylbenzene	<2.0	<2.0	<2.0	4.8	4.4	<2.0	<2.0	<2.0	<2.0	<2.0	NL
1,2,4-Trimethylbenzene	<2.0	<2.0	<2.0	23	21	<2.0	<2.0	<2.0	<2.0	<2.0	NL
sec-Butylbenzene	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NL
4-Isopropyltoluene	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NL
1,4-Dichlorobenzene	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NL
1,2,4-Trichlorobenzene	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NL
Naphthalene	<5.0	<5.0	<5.0	12	12	<5.0	<5.0	<5.0	<5.0	<5.0	NL
Semi-volatile Organic Compounds (SVOCs) - (ug/L - ppb)											
2-Methylphenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NL
4-Methylphenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NL
Benzoic Acid	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	NL
Naphthalene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NL
Dimethyl phthalate	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NL
Di-n-butyl phthalate	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NL
Bis(2-ethylhexyl)phthalate	<10	<10	<10	<10	<10	1.2 J	<10	<10	<10	<10	NL
Metals (ug/L -ppb)											
Arsenic	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	NL
Barium	15 J	19 J	45 J	52 J	52 J	<200	68 J	43 J	12 J	<200	NL
Pesticides (ug/L -ppb)											
gamma-BHC	<0.0064	<0.0064	<0.0064	<0.0064	<0.0064	<0.0064 UJ[1]	<0.0064	<0.0064	<0.0064	<0.0064 UJ[1]	NL

groundwater.

NOTES:
UJ1 = Estimate (J/UJ) the positive and non-detect results for gamma-BHC due to MS/MSD %RPD exceedances.

UJ2 = Estimate (J/UJ) the positive and non-detect results for methylene chloride due to contamination detected in the Trip Blank.

Results shown in bold indicate that concentration exceeds Method 1 Industrial/Commercial Direct Exposure Criteria
Results shown in italics indicate that concentration exceeds GB Groundwater Objective.

APPENDIX C

EXPLORATION LOGS

APPENDIX C-1

SITE 04 SOIL BORING LOGS

SOIL BORING LOG

		AOC:	04
		Boring No.:	SS-01
Client: Kerr-McGee	Project No. 3618048122.02	Protection:	Mod. D
Contractor: MACTEC	Date Started: 1/19/06	Completed:	1/19/06
Method: Geoprobe	Casing Size: 1.5"	PI Meter:	Thermo 580 B
Ground Elev.:	Soil Drilled: Geologic (Damien)	Total Depth:	4'
Logged by: PJM/DLC	Checked by: RP	Below Ground:	1.0'
Screen: ~~NA~~ SS (ft.)	Riser: ~~N/A~~ (ft.) Diam: N/A (ID)	Material: ~~PVC~~ N/A	Page 1 of: 1

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
1	RI22-SB50102-GW50101 RI22-SB50102	1-2'		24"	BT 10	2" grass topsoil 25" Loose, brown to dark brown fine SAND, some SILT, some med to coarse SAND petroleum odor, moist		RI22-SB50102-GW50101 RI22-SB50102 DLC	DTW = 1.0'
2									
3									
4									

Note: An unfiltered and a filtered gw grab sample were collected from a depth interval of 1 to 4 ft bgs using a 1" dia. slotted PVC pipe following soil boring.

SOIL BORING LOG

			AOC: 04
			Boring No.: SS-02
Client: Kemron		Project No. 361804B122.02	Protection: Mod. D
Contractor: MACTEC	Date Started: 1/18/06		Completed: 1/18/06
Method: Geoprobe	Casing Size: 1.5"		PI Meter: Thermo 580B
Ground Elev.:	Soil Drilled: Geologic (Damien)		Total Depth: 4'
Logged by: PDM/DLC	Checked by: RP		Below Ground: 1.0'
Screen: ~~N/A~~ SS (ft.)	Riser: N/A (ft.)	Diam: N/A (ID)	Material: ~~PVC~~ N/A Pm Pm	Page 1 of: 1

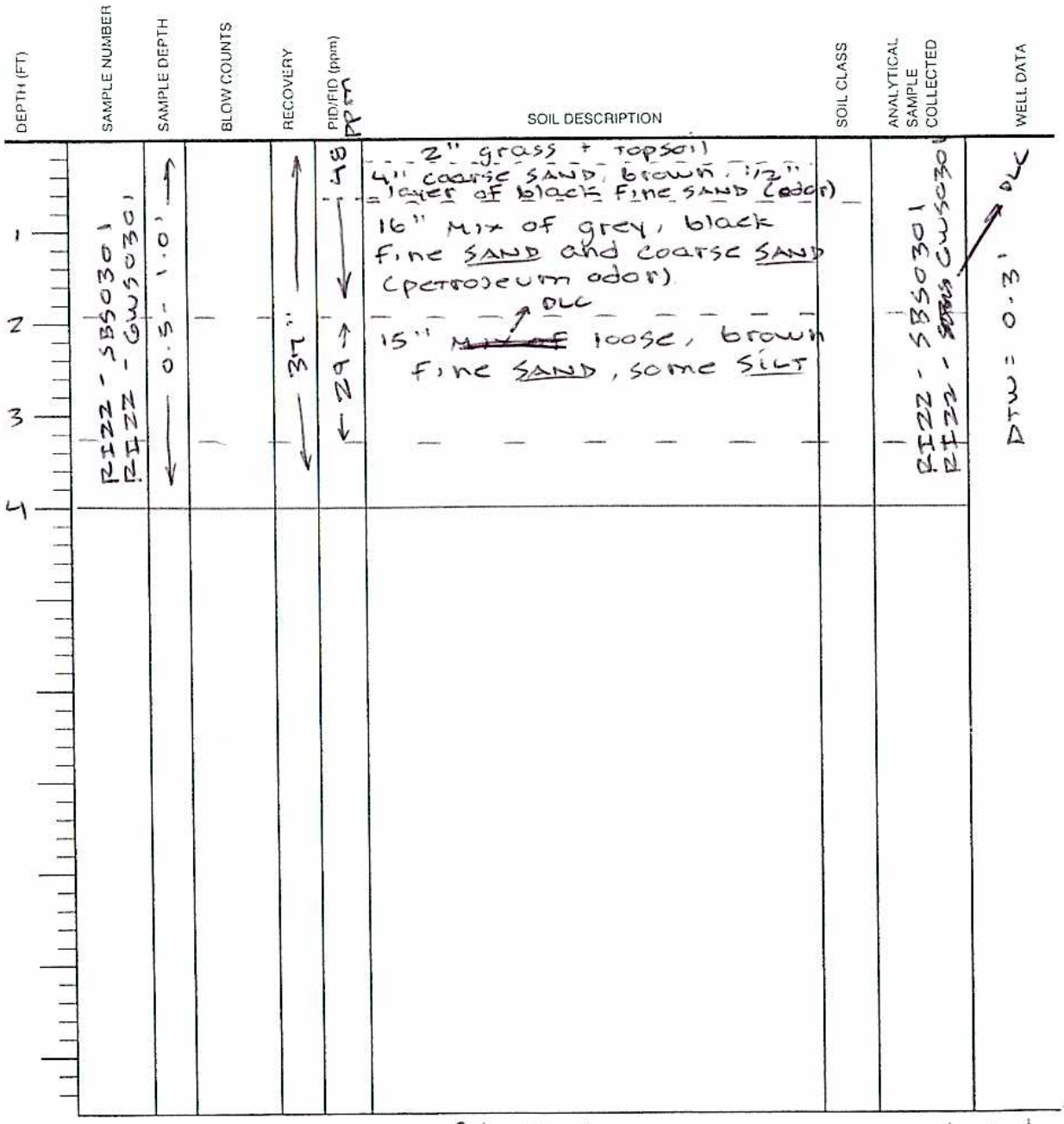
DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
1	RH22-SB02021 RH22-GW02021	1-2'		48"		2" grass + topsoil 38" brown, loose, fine SAND some SILT, some med SAND, trace organics moist.		RH22-SB02021 RH22-GW02021	DTW = 1.0' 5' screen PVC
2									
3									
4						8" Grey/light brown fine to med SAND moist			

Note: An unfiltered and a filtered GW grab sample ~~was~~ were collected from a depth interval of 1 to 4 ft bgs using a 1" dia slotted PVC pipe following soil boring.

SOIL BORING LOG
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

SOIL BORING LOG

		AOC:	04
		Boring No.:	SS-03
Client: Kerr-McGee	Project No. 3618048122.02	Protection:	Mod. D
Contractor: MACTEC	Date Started: 1/18/06	Completed:	1/18/06
Method: Geoprobe	Casing Size: 1.5"	PI Meter:	Thermo 580B
Ground Elev.:	Soil Drilled: Geologic (Damien)	Total Depth:	4'
Logged by: PJM/DLC	Checked by: RP	Below Ground:	0.3'
Screen: 5 (ft.) P	Riser: N/A (ft.)	Diam: N/A (ID)	Material: ~~PVC~~ N/A P	Page 1 of: 1



Note: An unfiltered and a filtered GW Grab sample were collected from a depth interval of 0.3 to 4 ft bgs using a 1" dia. slotted PVC pipe following soil boring.

SOIL BORING LOG
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

SOIL BORING LOG

		AOC:	04 DLC
		Boring No.:	~~SB04~~ SS-04
Client: Kerr-McGee	Project No. 36180481 22.02	Protection:	Mod. D
Contractor: MACTEC	Date Started: 1/19/06	Completed:	1/19/06
Method: Geoprobe	Casing Size: 1.5"	PI Meter:	Thermo 580B
Ground Elev.:	Soil Drilled: GeoLogic	Total Depth:	4'
Logged by: PSM / DLC	Checked by: RP	Below Ground:	2.0'
Screen: N/A (ft.) Riser: N/A (ft.) Diam: N/A (ID) Material: N/A		Page	1 of: 1

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
1	RI22 - SB04G2			24"	10	1" grass + topsoil 6" brown, med SAND some coarse SAND 14" loose, brown fine sand some SILT some organics, slight pet. odor, moist	SM	SB04G2	
2	RI22 - SB04G2				34	17" loose brown fine SAND, some SILT some organics, slight petro. odor, moist.	SM	SB04G2	▽ = 2.0'
3									
4									

Note: An unfiltered and a filtered GW grab sample were collected from a depth interval of ~~1~~ 2 to 4 ft bgs. using a 1" dia. slotted PVC pipe following soil boring.

SOIL BORING LOG
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

SOIL BORING LOG

		AOC: 04	
		Boring No.: SS-05	
Client: Jeemson	Project No.	Protection: Mod. q DLC	
Contractor: MACTEC	Date Started: 1/18/06	Completed: 1/18/06	
Method: Geoprobe	Casing Size: 1.5"	PI Meter: Thermo 580 B	
Ground Elev.:	Soil Drilled: Geologic (Damien)	Total Depth: 4'	
Logged by: PJM/DLC	Checked by: RP	Below Ground: 0.6'	
Screen: N/A SS (ft.)	Riser: N/A (ft.)	Diam: N/A (ID)	Material: N/A PVC Pm
Pm			Page 1 of: 1

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
1	RI22-SB50502 RI22-GW50501	1-2'		30"	0.8	1" grass + topsoil 3" brown, coarse SAND 2" grey, fine to med SAND Pet odor		RI22-SB50502 RI22-GW50501	DTW = 0.6'
2					3.7	12" Loose, brown, Fine SAND, some SILT Pet. odor. black, sticky soil, petroleum impacted			
3					32	12" grey, loose, fine SAND and SILT Pet. odor.			
4									

Note: An unfiltered and a filtered GW grab sample were collected from a depth interval of 0.6 to 4 ft. bgs using a 1" dia. slotted PVC pipe following soil boring.

SOIL BORING LOG
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

SOIL BORING LOG

		AOC:	04
		Boring No.:	SS-06
Client: Kennon	Project No. 361804.8122.02	Protection:	Mod. D
Contractor: MACTEC	Date Started: 1/19/06	Completed:	1/19/06
Method: Geoprobe	Casing Size: 1.5"	PI Meter:	Thermo 580B
Ground Elev.:	Soil Drilled: Geologic (Damien)	Total Depth:	4'
Logged by: PJM/DLC	Checked by: RP	Below Ground:	2.5'
Screen: N/A (ft.)	Riser: N/A (ft.) Diam: N/A (ID) Material: N/A	Page	1 of: 1

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
1	EJZZ-SB50603 EJZZ-SB50604	0-1' DLC		39"		1" topsoil + grass 13" brown, med SAND, some coarse SAND 5" light brown, fine to med SAND 20" Loose, brown, fine SAND, some SILT		EJZZ-SB50603 EJZZ-SB50604	DTW = 2.5'
2									
3									
4									

Note: An unfiltered and a filtered GW grab sample were collected from a depth interval of 2.5 to 4 ft. bgs using a 1" dia. slotted PVC pipe following soil boring.

SOIL BORING LOG
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

SOIL BORING LOG

		AOC:	04
		Boring No.:	SS-09
Client: Kennon	Project No. 36180481122.02	Protection:	Mod. D
Contractor: MACTEC	Date Started: 1/19/06	Completed:	~~1/19/06~~ 1.24.06 pm pm
Method: Geoprobe	Casing Size: 1.5"	PI Meter:	Thermo 580B
Ground Elev.:	Soil Drilled: GeoLogic (Damien)	Total Depth:	~~8~~ 12' pm
Logged by: PJM/DLC	Checked by: RP	Below Ground:	0.4'
Screen: N/A (ft.)	Riser: N/A (ft.) Diam: N/A (ID) Material: N/A	Page	1 of: 2 pm

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
1	RI22-SB50702 RI22-GW50701	1-2' bgs		25"	9	1" Topsoil + grass 8" Gravel and coarse SAND 5" light brown med to coarse SAND		RI22-SB50702 RI22-GW50701	DTW = 0.4' MW-15
2					14	1" Grey and black med. SAND pet. odor, some gravel 11" Black, loose fine to med SAND, some SILT, some grey SAND, pet odor, trace organics			
3									
4									
5				31"	2	Loose grey Fine SAND (wet) 12"		RI-23 GW50701	
6									
7					-	19" Loose, brown, fine SAND, some gravel (wet)			
8									
9									
10									

SOIL BORING LOG
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

SOIL BORING LOG

		AOC: 04	
		Boring No.: SS-07	
Client: Kerr-McGee	Project No. 3618048122.02	Protection: pm 25	
Contractor: MACTEC	Date Started: 1/19/06	Completed: 1/~~19~~/06	
Method: Geoprobe	Casing Size: 1.5"	PI Meter: Thermo 580B	
Ground Elev.: ~~PSM/DLC~~ pm	Soil Drilled: Geologic (Damien)	Total Depth: 12'	
Logged by: PSM/DLC	Checked by: ~~N/A~~ RP	▽ Below Ground: 0.4	
Screen: N/A (ft.)	Riser: N/A (ft.) Diam: ~~N/A~~ pm (ID)	Material: ~~N/A~~ pm PVC	Page 2 of: 2

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
9		10-11'	2/4	32"	19, 159, 168	Dense med to coarse SAND and GRAVEL, pet odor. 32" recovery.		RIZZ-SS07-11	DTW = 0.4' Well ID = MW-15
10									
11									
12									

Note: An unfiltered and a filtered GW grab sample were collected from a depth interval of 0.4 to 4 ft bgs using a 1" dia. slotted PVC pipe following soil boring from 0 to 4 ft bgs.

SOIL BORING LOG

		AOC:	04
		Boring No.:	SS-08
Client: Kemron	Project No. 361804.8122.02	Protection:	Mod. D
Contractor: MACTEC	Date Started: 1/19/06	Completed:	1/19/06
Method: Geoprobe	Casing Size: 1.5"	PI Meter:	Thermo 580B
Ground Elev.:	Soil Drilled: GeoLogic (Damien)	Total Depth:	4'
Logged by: PJM/DLC	Checked by: RP	Below Ground:	3.5' 2.2'
Screen: N/A (ft.)	Riser: N/A (ft.) Diam: N/A (ID) Material: N/A	Page	1 of: 1

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
1	RI22-SB50807 RI22-GW50801	1-2'		38"	45 27 13	5" brown, med to coarse SAND, some gravel 2" Black fine SAND, petro odor 6" dark brown fine to med SAND some SILT, pet. odor 25" Loose drk brown Fine SAND and SILT. petro odor			PVC = 3.5' 2.2'
2									
3									
4									

Note: An unfiltered and a filtered GW grab sample were collected from a depth interval of 2.2 to 4 ft bgs using a 1" dia. slotted PVC pipe following soil boring.

SOIL BORING LOG
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

SOIL BORING LOG		AOC: 04 DLC
		Boring No.: ~~SS10~~ SS-09
Client: Kemron	Project No. 3618048122.02	Protection: Mod. D
Contractor: MACTEC	Date Started: 1/24/06	Completed: 1/24/06
Method: Geoprobe	Casing Size: 1.5"	PI Meter: Thermo 580B
Ground Elev.:	Soil Drilled: Geologic (Damien)	Total Depth: 12'
Logged by: PJM / DLC	Checked by: RP	▽ Below Ground: 2'
Screen: N/A (ft.) Riser: N/A (ft.)	Diam: N/A (ID) Material: N/A	Page 1 of: 1

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
0–4	RI22-SBSS09Q02 ~~RI22~~ Grab/Gustaf DLC	1-2'		37"	18, 192.	1" grass + topsoil 17" brown, loose, med to coarse SAND and GRAVEL, pet. odor 19" dk brown fine to med SAND, some SILT, some GRAVEL pet odor			
4–8	~~[illegible]~~			22"	15 ~~[illegible]~~, 210	12" v. dense, light brown fine SAND and SILT, pet odor. wet. 10" v. dense, fractured rock, green to grey, v. fine SAND. pet. odor, wet.			DTW = ~~X~~ 2' (DLC)
8–12	~~[illegible]~~	10-11'		36"	4, 7, 9	18" Loose brown, coarse SAND and GRAVEL, wet. 18" Loose grey, coarse SAND and GRAVEL, wet			

DLC

Note: An unfiltered and a filtered GW grab sample were collected from a depth interval of 2 to 12 ft bgs using a 1" dia. slotted PVC pipe following soil boring.

SOIL BORING LOG
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

2004005b L 7

SOIL BORING LOG

Client: Kerr-McGee	Project No. 361804812 2. 02	AOC: 04	
Contractor: MACTEC	Date Started: 1/25/06	Boring No.: SS-10	
Method: Geoprobe	Casing Size: 1.5"	Protection: Mod. D	
Ground Elev.:	Soil Drilled: Geologic (Damien)	Completed: 1/25/06	
Logged by: PSM/DLC	Checked by: RP	PI Meter: Thermo 580B	
Screen: N/A (ft.)	Riser: N/A (ft.)	Diam: N/A (ID)	Material: N/A
		Total Depth: 4'	
		▽ Below Ground: 1'	
		Page 1 of: 1	

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
1		1-2 bgs	2/A	36"	203, 197, 26	12" Loose brown coarse SAND, and Fine SAND, some SILT little GRAVEL.		EN22-SB51002	DTW: 1', 5' Screen
2						24" Dark brown, med-dense fine SAND and SILT. little GRAVEL, pet odor.			
3									
4									

Note: An unfiltered and a filtered GW grab sample were collected from a depth interval of 1 to 4 ft bgs using a 1" dia. slotted PVC pipe following soil boring.

SOIL BORING LOG
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

SOIL BORING LOG

Client: 94th RRC Lincoln	Project No. 36180481 22	AOC: Site 04	
		Boring No.: SS-11	
Contractor: Geologic	Date Started: 5.10.07	Protection: Mod. D	
Method: Geoprobe	Casing Size: 1.5"	Completed: 5.10.07	
Ground Elev.: —	Soil Drilled: 0-4'	PI Meter: Mini RAE 2000	
Logged by: PSM	Checked by:	Total Depth: 4'	
		▽ Below Ground: 2.4	
Screen: — (ft.) Riser: — (ft.) Diam: — (ID) Material: —		Page 1 of: 1	

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
0									
1				24"	0.2	0-2" grass + topsoil 10" dk. brown to black, dry f. SAND, some Silt + Organics	SP	RI22-SSS1100 @ 0855	
2					0.0	12" tan, little grey mottling fine SAND + SILT, wet	SP-ML		
3									
4									

SOIL BORING LOG
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC. Inc.

SOIL BORING LOG

Client: 94th RRC Lincoln	Project No. 361804B122	AOC: ~~SS~~ Site 04	
Contractor: Geologic	Date Started: 5.10.07	Boring No.: SS-12	
Method: Geoprobe	Casing Size: 1.5"	Protection: Mod. D	
Ground Elev.: —	Soil Drilled: 0-4' bgs	Completed: 5.10.07	
Logged by: PSM	Checked by:	PI Meter: Mini RAE 2000	
Screen: — (ft.) Riser: — (ft.) Diam: — (ID) Material: —		Total Depth: 4'	
		▽ Below Ground: 3.1	
		Page 1 of: 1	

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
0						0-2" grass + topsoil			
				37"	0.2	12" tan and dk. brown f. SAND, little Silt, dry	SP		
1					91.7	6" dk brown/black f. SAND, dry, some Silt, pet. odor, trace gravel	SP	RI22-SS1201 @ 0930	
2						grey f SAND, slight pet. odor, moist	SP		
3					2.1				
4									

SOIL BORING LOG
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

SOIL BORING LOG

Client: 94th RRC Lincoln	Project No. 36180481122	AOC: Site 04	
Contractor: Geologic	Date Started: 5.10.07	Boring No.: SS-13	
Method: Geoprobe	Casing Size: 1.5"	Protection: Mod. D	
Ground Elev.: —	Soil Drilled: 0-4' bgs	Completed: 5.10.07	
Logged by: PJM TRH	Checked by:	PI Meter: Mini RAE 2000	
Screen: — (ft.)	Riser: — (ft.) Diam: — (ID) Material: —	Total Depth: 4'	
		Below Ground: 2.5'	
		Page 1 of: 1	

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
0				27"	0.6	0-.3: Grass root zone .3-.8: Loamy silty sand. Trace dk. brown triangular gravel.	SP		
1					31.0 @ 1.5' bgs	.8-1.3: Light brown silty sand	SP		
2						1.3-1.9: Dark brown/black silty fine to m. sand w/ trace angular gravel petroleum odor	SP	RI22-555130 1	@ 1000
3						1.9 ~ End: light gray/white silty fine/med sand some light, dry brown strata interspersed.	SP		
4									

SOIL BORING LOG
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

SOIL BORING LOG

Client: 94th RRC	Project No. 3618048122	AOC: Site 04	
Contractor: Geologic	Date Started: 5.10.07	Boring No.: SS-14	
Method: Geoprobe	Casing Size: 1.5"	Protection: Mod. D	
Ground Elev.: —	Soil Drilled: 0-4' bgs	Completed: 5.10.07	
Logged by: PSM	Checked by:	PI Meter: Mini RAE 2000	
Screen: — (ft.) Riser: — (ft.) Diam: — (ID) Material: —		Total Depth: 4'	
		Below Ground: 3.0	
		Page 1 of: 1	

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
0				20"		0-1" grass + topsoil 1-9" brown f. to coarse SAND, trace Silt, trace Gravel, dry	SW		
1					45	6 10" dk brown/black, moist SILT, some Clay, tr. Sand	ML	RI22-SS14-01 @ 1045	
2									
3									
4									

SOIL BORING LOG
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

SOIL BORING LOG

Client: 94th RRC Lincoln	Project No. 361804B122	AOC: Site 04	
Contractor: Geologic	Date Started: 5.10.07	Boring No.: SS-15	
Method: Geoprobe	Casing Size: 1.5"	Protection: Mod. D	
Ground Elev.: —	Soil Drilled: 0 - 4'	Completed: 5.10.07	
Logged by: PSM	Checked by:	PI Meter: Mini RAE 2000	
Screen: — (ft.)	Riser: — (ft.) Diam: — (ID) Material: —	Total Depth: 4'	
		Below Ground: dry	
		Page 1 of: 1	

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
0				29"	0.0	0-1" grass + topsoil 7" brown/grey f. to med SAND, trace Gravel + Organic, dry	SP		
1					0.9 ppm	14" dk. brown/black SILT, dry to moist, some Gravel, trace Sand	ML		RI22-SS51501,
2					1.3 @ 0.9'	5" dk. gray wet SILT,			RI22-SSD1501,
3					11.8 ppm @ 1.8'	trace Sand, trace Clay	MH		RI22-SSMS1501 @ 1120
4									

SOIL BORING LOG
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC. Inc.

SOIL BORING LOG

Client: 94th RRC, Lincoln	Project No. 361804B122	AOC: Site 04	
Contractor: Geologic	Date Started: 5.10.07	Boring No.: SS-16	
Method: Geoprobe	Casing Size: 1.5"	Protection: Mod. D	
Ground Elev.: -	Soil Drilled: 0-4' bgs	Completed: 5.10.07	
Logged by: PJM	Checked by:	PI Meter: MiniRAE 2000	
Screen: - (ft.) Riser: - (ft.) Diam: - (ID) Material: -		Total Depth: 4'	
		Below Ground: 2.6	
		Page 1 of: 1	

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
0				28"	7.4	0-1" grass + topsoil 12" brown / dk brown / red / and grey f. to coarse SAND trace Silt, dry	SW	RI22- 5551600	@ 1245
1									
2					0.5	15" dk brown / black f. SAND and SILT, dry (wet @ 2' bgs)	SP-ML		
3									
4									

SOIL BORING LOG
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC. Inc.

SOIL BORING LOG

Client: 94th RRC	Project No. 361804B122	AOC: Site 04	
Contractor: Geologic	Date Started: 5.11.07	Boring No.: SS-17	
Method: Geoprobe	Casing Size: 1.5"	Protection: Mod. D	
Ground Elev.: —	Soil Drilled: 0-4' bgs	Completed: 5.11.07	
Logged by: PSM	Checked by:	PI Meter: Mini RAE 2000	
Screen: — (ft.) Riser: — (ft.) Diam: — (ID) Material: —		Total Depth: 4'	
		Below Ground: 2.2	
		Page 1 of: 1	

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
0				22"	0.1	0-1" grass + topsoil 9" brown med. to coarse SAND and GRAVEL, dry	SP, GP		
1					0.1	12" reddish brown f. to med. SAND, some Silt, some Gravel, moist wet @ 1.8'	SP	RI22-SS51701 @ 0930	
2									
3									
4									

SOIL BORING LOG
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

SOIL BORING LOG

AOC: Site 04			
Boring No.: SS-18			
Client: 94th RRC Lincoln	Project No. 361804B122	Protection: Mod. D	
Contractor: Geologic	Date Started: 5-11-07	Completed: 5-11-07	
Method: Geoprobe	Casing Size: 1.5"	PI Meter: Mini RAE 2000	
Ground Elev.: —	Soil Drilled: 0-4' bgs	Total Depth: 4'	
Logged by: PJM	Checked by:	Below Ground: 3.1	
Screen: — (ft.)	Riser: — (ft.) Diam: — (ID) Material: —	Page 1 of: 1	

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
0				32"	0.4	0-1" grass & topsoil 13" brown med. to coarse SAND & GRAVEL, trace grey Silt, dry	SP-GP	RI22-SS51800	@ 1000
1					0.0	4" black SILT, some Sand and Organic, moist	ML		
2						15" grey/yellow SILT, some med. Sand, trace Gravel wet	ML		
3									
4									

SOIL BORING LOG
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

SOIL BORING LOG

Client: 94th RRC Lincoln	Project No. 36180481222	AOC: Site 04	
Contractor: Geologic	Date Started: 5.11.07	Boring No.: SS-19	
Method: Geoprobe	Casing Size: 1.5"	Protection: Mod. D	
Ground Elev.: —	Soil Drilled: 0-4' bgs	Completed: 5.11.07	
Logged by: PJM	Checked by:	PI Meter: MicroRAE 2000	
Screen: — (ft.) Riser: — (ft.) Diam: — (ID) Material: —		Total Depth: 4'	
		Below Ground: 3.0'	
		Page 1 of: 1	

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
0				30"	1.8	0-2" grass & topsoil 12" light brown, fi to coarse SAND, some Gravel, dry	SW		
1					2.3	6" black SILT, some Sand, moist, trace Organic	ML	RI22-SS1901 @ 1030	
2						20" olive/brown f. SAND and SILT, wet	SP-ML		
3									
4									

SOIL BORING LOG
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

SOIL BORING LOG

Client: 94th RRC	Project No. 361804B122	AOC: Site 04	
Contractor: Geologic	Date Started: 5.11.07	Boring No.: SS-20	
Method: Geoprobe	Casing Size: 1.5"	Protection: Mod. D	
Ground Elev.: —	Soil Drilled: 0–4' bgs	Completed: 5.11.07	
Logged by: PSM/TRH	Checked by:	PI Meter: Min. RAE 2000	
Screen: — (ft.) Riser: — (ft.) Diam: — (ID) Material: —		Total Depth: 4'	
		▽ Below Ground: 3.0' 3.4'	
		Page 1 of: 1 pp	

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	RECOVERY	PID/FID (ppm)	SOIL DESCRIPTION	SOIL CLASS	ANALYTICAL SAMPLE COLLECTED	WELL DATA
0				11"		0-2" Organic mat.l roots loamy soil			
1				29	0.8	2"-11" m/c silty sand, light brown some sub round gravel to 1"	SP	RJ22-SS52000 @ 1100	
2						11"-1'9" Same as above but heavier silt content and more angular gravel	SP		
3						TH 1.9"-2' crushed stone			
					0.6	2'-2'8" dark brown silt, moist	ML		
4						2'8"-2'5" light brown silty sand with some gray banding, wet	SP		

SOIL BORING LOG
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC. Inc.

APPENDIX C-2

SITE 04 DIRECT-PUSH GROUNDWATER SAMPLING LOGS

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

JOB NUMBER 361804B122

PROJECT 94th RRC Lawla, RI | FIELD SAMPLE NUMBER GP-01 | EVENT NO. —

SITE ID Site 04 | SITE TYPE — | DATE 5.8.07

ACTIVITY START 1245 END 1330 | SAMPLE TIME 1320 | FILE TYPE —

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: ☐ TOP OF WELL RISER ☐ TOP OF PROTECTIVE CASING ✓ ground ~~HISTORICAL~~

INITIAL DEPTH TO WATER	2.4 FT	PROTECTIVE CASING STICKUP (FROM GROUND)	— FT	CASING / WELL DIFFERENCE	— FT
FINAL DEPTH TO WATER	2.4 FT	WELL DEPTH (TOR)	7.5 FT	PID AMBIENT AIR	0.0 PPM
SCREEN LENGTH	5 FT	PRESSURE TO PUMP	— PSI	PID WELL MOUTH	0.0 PPM
TOTAL VOL. PURGED	2.0 GAL	REFILL SETTING	—	DISCHARGE SETTING	—
				WELL DIAMETER	1 IN

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY:

INTEGRITY:	YES	NO	N/A
CAP	—	—	—
CASING	—	—	—
LOCKED	—	—	—
COLLAR	—	—	—

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (+/- deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	% DO ~~(mg/L)~~	TURBIDITY (ntu)	REDOX (+/- mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
1255	Begin	Purge	@	300 ml/min						
1306		300	11.11	0.300	6.06	3.5	>1000	-44.4	6	flow-through
1320	Collect	Sample		RI22-GPS0101		and	RI22-GPD0101			cell

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	TYPE OF TUBING	TYPE OF PUMP MATERIAL	TYPE OF BLADDER MATERIAL
☐ BLADDER	☒ HIGH DENSITY POLYETHYLENE	☐ STAINLESS STEEL	☐ TEFLON
☒ PERISTALTIC ☐ OTHER _____	☐ OTHER _____	☐ OTHER _____	☐ OTHER _____

ANALYTICAL PARAMETERS

ANALYSIS	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
VOC	8260 (Pres. B)	HCl	3x 40mL	✓	RI22-GPS0101
Total Pb	6010	HNO_3	500mL	✓	"
Dissolved Pb	6010	HNO_3	500mL	✓	"

PURGE OBSERVATIONS

no odor or sheen

PURGE WATER CONTAINERIZED (YES) NO

NOTES:

SIGNATURE: Phillip J. Allen

CHECKED BY: _____

LOW FLOW GROUNDWATER DATA RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004

MACTEC, Inc.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

JOB NUMBER 361804B122

PROJECT 94th RRC Lincoln, RI | FIELD SAMPLE NUMBER GP-01 | EVENT NO. 1

SITE ID Site 04 | SITE TYPE — | DATE 5.17.07

ACTIVITY START 1005 END 1035 | SAMPLE TIME 1030 | FILE TYPE —

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: ☐ TOP OF WELL RISER ☐ TOP OF PROTECTIVE CASING ✓ ground

INITIAL DEPTH TO WATER	N/A FT	PROTECTIVE CASING STICKUP (FROM GROUND)	— FT	CASING / WELL DIFFERENCE	— FT
FINAL DEPTH TO WATER	N/A FT	HISTORICAL WELL DEPTH (TOR)	16 FT	WELL DIAMETER	1 IN
SCREEN LENGTH	2 FT	PRESSURE TO PUMP	— PSI	PID AMBIENT AIR	0.0 PPM
TOTAL VOL. PURGED	0.8 GAL	REFILL SETTING	—	PID WELL MOUTH	0.1 PPM
		DISCHARGE SETTING	—		

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY:

INTEGRITY:	YES	NO	N/A
CAP	—	—	—
CASING	—	—	—
LOCKED	—	—	—
COLLAR	—	—	—

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (+/- deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	% DO (mg/L)	TURBIDITY (ntu)	REDOX (+/- mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
1012	Begin purging @	300 mL/min								
1022	Fill YSI cup for parameters,					stop purging				
~~0930~~ 1025	N/A	—	10.97	0.229	5.93	49.2	132	-13.0	15	YSI cup
1030	Collect Sample	RI22-GPS0114								

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	TYPE OF TUBING	TYPE OF PUMP MATERIAL	TYPE OF BLADDER MATERIAL
☐ BLADDER	☒ HIGH DENSITY POLYETHYLENE	☐ STAINLESS STEEL	☐ TEFLON
☒ PERISTALTIC ☐ OTHER _____	☐ OTHER _____	☐ OTHER _____	☐ OTHER _____

ANALYTICAL PARAMETERS

ANALYSIS	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
VOC	8260	HCl	3 x 40mL	✓	RI22-GPS0114

PURGE OBSERVATIONS (0.2 ppm) no odor or sheen

PURGE WATER CONTAINERIZED (YES) NO

NOTES:

SIGNATURE: _____

CHECKED BY: _____

LOW FLOW GROUNDWATER DATA RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004

MACTEC, Inc.

W2004037c.xls

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

JOB NUMBER 361804B122

PROJECT 94th RRC Lincoln, RI | FIELD SAMPLE NUMBER GP-02 | EVENT NO. —

SITE ID Site 04 | SITE TYPE — | DATE 5-8-07

ACTIVITY START 1400 END 1450 | SAMPLE TIME 1415 | FILE TYPE —

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: ☐ TOP OF WELL RISER ☐ TOP OF PROTECTIVE CASING ✓ ground ~~HISTORICAL~~

INITIAL DEPTH TO WATER	3.7 FT	WELL DEPTH (TOR) Ground	7.7 FT	PROTECTIVE CASING STICKUP (FROM GROUND)	— FT
FINAL DEPTH TO WATER	— FT	PID AMBIENT AIR	0 PPM	CASING / WELL DIFFERENCE	— FT
SCREEN LENGTH	5 FT	PRESSURE TO PUMP	— PSI	PID WELL MOUTH	0 PPM
TOTAL VOL. PURGED	one well vol GAL	REFILL SETTING	—	DISCHARGE SETTING	—
				WELL DIAMETER	1 IN

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY:

INTEGRITY:	YES	NO	N/A
CAP	—	—	—
CASING	—	—	—
LOCKED	—	—	—
COLLAR	—	—	—

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (+/- deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	% DO (mg/L)	TURBIDITY (ntu)	REDOX (+/- mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
1405	Begin	Purging	—	purge	dry					
1415	Collect	Sample		RI22-GPS0201						
1440	—	—	13.88	0.137	5.64	31.2	78.1	60.6	7	in 45l Cup

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	TYPE OF TUBING	TYPE OF PUMP MATERIAL	TYPE OF BLADDER MATERIAL
☐ BLADDER	☒ HIGH DENSITY POLYETHYLENE	☐ STAINLESS STEEL	☐ TEFLON
☒ PERISTALTIC ☐ OTHER _____	☐ OTHER _____	☐ OTHER _____	☐ OTHER _____

ANALYTICAL PARAMETERS

ANALYSIS	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
VOC	8260	HCl	3x40mL	✓	RI22-GPS0201
Total Pb	6010	HNO_3	500 mL	✓	"
dissolved Pb (f.f.)	6010	HNO_3	500 mL	✓	"

PURGE OBSERVATIONS: no odor or sheen

PURGE WATER CONTAINERIZED (YES) NO

NOTES:

SIGNATURE: Philip J. Uffle

CHECKED BY: _____

LOW FLOW GROUNDWATER DATA RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004

MACTEC, Inc.

ELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

JOB NUMBER 36180781.22

PROJECT: 94th RRC Lincoln, NE | FIELD SAMPLE NUMBER: GP-02 | EVENT NO.: 1

SITE ID: Site 04 | SITE TYPE: — | DATE: 5.17.07

ACTIVITY: START 1140 END 1210 | SAMPLE TIME: 1200 | FILE TYPE: 1 —

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: ☐ TOP OF WELL RISER ☐ TOP OF PROTECTIVE CASING ✓ ground

INITIAL DEPTH TO WATER	N/A FT	HISTORICAL WELL DEPTH (TOR)	16 FT	PROTECTIVE CASING STICKUP (FROM GROUND)	— FT
FINAL DEPTH TO WATER	N/A FT	PID AMBIENT AIR	0.0 PPM	CASING / WELL DIFFERENCE	— FT
SCREEN LENGTH	2 FT	PRESSURE TO PUMP	— PSI	PID WELL MOUTH	2.7 PPM
TOTAL VOL. PURGED	1 well Vol. ~~GAL~~	REFILL SETTING	—	DISCHARGE SETTING	—
				WELL DIAMETER	1 IN

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY:

INTEGRITY:	YES	NO	N/A
CAP	—	—	—
CASING	—	—	—
LOCKED	—	—	—
COLLAR	—	—	—

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (+/- deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	%/DO (mg/L)	TURBIDITY (ntu)	REDOX (+/- mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
1155	Well	purged, dry	after	20 s	@ 300 ml/min					
1200	Collect Sample		RI22-GPS0214							
1205	—	—	10.72	0.436	6.08	44.4	300	35.8	16	YSI cup

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	TYPE OF TUBING	TYPE OF PUMP MATERIAL	TYPE OF BLADDER MATERIAL
☐ BLADDER	☒ HIGH DENSITY POLYETHYLENE	☐ STAINLESS STEEL	☐ TEFLON
☒ PERISTALTIC ☐ OTHER _____	☐ OTHER _____	☐ OTHER _____	☐ OTHER _____

ANALYTICAL PARAMETERS

ANALYSIS	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
VOC	8260	HCl	3x40ml	✓	RI22-GPS0214

PURGE OBSERVATIONS: no sheen or odor (0.4 ppm)

PURGE WATER CONTAINERIZED: (YES) NO

NOTES:

SIGNATURE: _____

CHECKED BY: _____

LOW FLOW GROUNDWATER DATA RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

W2004037c.xls

LD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

JOB NUMBER 361804.8122

PROJECT 94th RRC, Lincoln, RI | FIELD SAMPLE NUMBER GP-03 | EVENT NO. —

SITE ID Site 04 | SITE TYPE — | DATE 5.8.07

CTIVITY START 1525 5/8/07 END 1030 5/9/07 | SAMPLE TIME 0820 | FILE TYPE 1st 5.9.07

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: ☐ TOP OF WELL RISER ☐ TOP OF PROTECTIVE CASING ✓ ground

INITIAL DEPTH TO WATER	3.1 FT	~~HISTORICAL~~ WELL DEPTH (TOR)	6.3 FT	PROTECTIVE CASING STICKUP (FROM GROUND)	— FT	CASING / WELL DIFFERENCE	— FT
FINAL DEPTH TO WATER	Dry FT	PID AMBIENT AIR	0 PPM			WELL DIAMETER	1 IN
SCREEN LENGTH	3 FT	PRESSURE TO PUMP	— PSI	PID WELL MOUTH	0 PPM		
TOTAL VOL. PURGED	1 well vol. GAL	REFILL SETTING	—	DISCHARGE SETTING	—		

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY:

INTEGRITY:	YES	NO	N/A
CAP	—	—	✓
CASING	—	—	✓
LOCKED	—	—	✓
COLLAR	—	—	✓

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (+/- deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	% ~~DO (mg/L)~~	TURBIDITY (ntu)	REDOX (+/- mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
1532	Begin Purging	—	dry	after	30 s					
0820	Collect Sample		RI22-GPS0301							@ pm on 5.9.07
1025	—	—	16.68	1.195	6.57	70.4	91.6	112.0	5	in 45l cup

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	TYPE OF TUBING	TYPE OF PUMP MATERIAL	TYPE OF BLADDER MATERIAL
☐ BLADDER	☒ HIGH DENSITY POLYETHYLENE	☐ STAINLESS STEEL	☐ TEFLON
☒ PERISTALTIC ☐ OTHER _____	☐ OTHER _____	☐ OTHER _____	☐ OTHER _____

ANALYTICAL PARAMETERS

ANALYSIS	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
VOC	8260	HCl	3 x 40 mL	✓	RI22-GPS0301
Total Pb	6010	HNO_3	1 x 500 mL	✓	"
Dissolved Pb (ff.)	6010	HNO_3	1 x 500mL	✓	"

PURGE OBSERVATIONS no sheen or odor

PURGE WATER CONTAINERIZED (YES) NO _____

NOTES:

SIGNATURE: _____

CHECKED BY: _____

LOW FLOW GROUNDWATER DATA RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004

MACTEC, Inc.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

JOB NUMBER 361804B122

PROJECT 94th RRC, Lincoln, RI | FIELD SAMPLE NUMBER GP-04 | EVENT NO. —

SITE ID Site 04 | SITE TYPE — | DATE 5.8.07 and 5.9.07

ACTIVITY START 1510 5/8/07 END 0945 5/9/07 | SAMPLE TIME 0800 | FILE TYPE —

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: ☐ TOP OF WELL RISER ☐ TOP OF PROTECTIVE CASING ✓ ground

INITIAL DEPTH TO WATER	5.7 FT	~~HISTORICAL~~ WELL DEPTH (TOR)	7.2 FT	PROTECTIVE CASING STICKUP (FROM GROUND)	— FT	CASING / WELL DIFFERENCE	— FT
FINAL DEPTH TO WATER	dry FT	PID AMBIENT AIR	0.0 PPM			WELL DIAMETER	1 IN
SCREEN LENGTH	5 FT	PRESSURE TO PUMP	— PSI	PID WELL MOUTH	0.0 PPM		
TOTAL VOL. PURGED	1 well vol. ~~GAL~~	REFILL SETTING	—	DISCHARGE SETTING	—		

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY:

INTEGRITY:	YES	NO	N/A
CAP	—	—	—
CASING	—	—	—
LOCKED	—	—	—
COLLAR	—	—	—

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (+/- deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	~~%~~ DO (~~mg/L~~)	TURBIDITY (ntu)	REDOX (+/- mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
1515	Begin purging -			dry	after 2		mini	on	5.8.07	
0800	Collect Sample			RI22-GPS0401			on	5.9.07		
0930	—	—	16.81	0.279	5.94	70.7	83.0	83.0	7	in YSI cup

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	TYPE OF TUBING	TYPE OF PUMP MATERIAL	TYPE OF BLADDER MATERIAL
☐ BLADDER	☒ HIGH DENSITY POLYETHYLENE	☐ STAINLESS STEEL	☐ TEFLON
☒ PERISTALTIC ☐ OTHER _____	☐ OTHER _____	☐ OTHER _____	☐ OTHER _____

ANALYTICAL PARAMETERS

ANALYSIS	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
VOC	8260	HCl	3X40mL	✓	RI22-GPS0401
Total Pb	6010	HNO_3	1X500mL	✓	"
Dissolved Pb (f.f.)	6010	HNO_3	1X500mL	✓	"

PURGE OBSERVATIONS: no odor or sheen

PURGE WATER CONTAINERIZED (YES) NO _____

NOTES:

SIGNATURE: _____

CHECKED BY: _____

LOW FLOW GROUNDWATER DATA RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004

MACTEC, Inc.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

JOB NUMBER 361804B122

PROJECT 94th RRC, Lincoln, RI | FIELD SAMPLE NUMBER GP-05 | EVENT NO. -

SITE ID Site 04 | SITE TYPE — | DATE 5-8-07

ACTIVITY START 1015 END 1050 | SAMPLE TIME 1040 | FILE TYPE —

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: ☐ TOP OF WELL RISER ☑ ~~TOP OF PROTECTIVE CASING~~ ground

INITIAL DEPTH TO WATER	(pw) 5 N/A FT	PROTECTIVE CASING STICKUP (FROM GROUND)	— FT	CASING / WELL DIFFERENCE	— FT
FINAL DEPTH TO WATER	(pw) 7.5 N/A FT	HISTORICAL WELL DEPTH (TOR)	8 FT	WELL DIAMETER	1 IN
SCREEN LENGTH	4 FT	PID AMBIENT AIR	0.0 PPM		
TOTAL VOL. PURGED	0.8 GAL	PRESSURE TO PUMP	— PSI	PID WELL MOUTH	0.0 PPM
		REFILL SETTING	—	DISCHARGE SETTING	—

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY:

INTEGRITY:	YES	NO	N/A
CAP	—	—	—
CASING	—	—	—
LOCKED	—	—	—
COLLAR	—	—	—

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (+/- deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	~~o/o~~ DO ~~(mg/L)~~	TURBIDITY (ntu)	REDOX (+/- mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
1030	Begin	purge	~~air to~~	~~cup for YSI~~		@	300 ml/min			through rods
1035	—	300	16.01	0.215	5.66	27.8	N/A	116	7	no temp. PVC
1040	Collect	Sample	RI22-GPS0501							well placed

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	TYPE OF TUBING	TYPE OF PUMP MATERIAL	TYPE OF BLADDER MATERIAL
☐ BLADDER	☒ HIGH DENSITY POLYETHYLENE	☐ STAINLESS STEEL	☐ TEFLON
☒ PERISTALTIC ☐ OTHER _____	☐ OTHER _____	☐ OTHER _____	☐ OTHER _____

ANALYTICAL PARAMETERS

ANALYSIS	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
VOC	8260	HCl	3x40mL	✓	RI22-GPS0501
total Pb	6010	HNO_3	1x500mL		"
dissolved Pb (f.f.)	6010	HNO_3	1x500mL		"

PURGE OBSERVATIONS: none (no sheen or odor)

PURGE WATER CONTAINERIZED (YES) NO _____

NOTES:

SIGNATURE: _____

CHECKED BY: _____

LOW FLOW GROUNDWATER DATA RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004

MACTEC, Inc.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

JOB NUMBER 361804B122

PROJECT	94th RRC, Lincoln, RI	FIELD SAMPLE NUMBER	GP-06	EVENT NO.	-
SITE ID	Site 04	SITE TYPE	-	DATE	5.8.07
ACTIVITY	START 1140 END 1230	SAMPLE TIME	1220	FILE TYPE	-

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: ☐ TOP OF WELL RISER ☑ TOP OF PROTECTIVE CASING ✓ ground

INITIAL DEPTH TO WATER	3.6 FT	PROTECTIVE CASING STICKUP (FROM GROUND)	- FT	CASING / WELL DIFFERENCE	- FT
FINAL DEPTH TO WATER	- FT	HISTORICAL WELL DEPTH (TOR)	7.2 FT	WELL DIAMETER	1 IN
SCREEN LENGTH	5 FT	PRESSURE TO PUMP	- PSI	PID AMBIENT AIR	0 PPM
TOTAL VOL. PURGED	1 well vol. ~~GAL~~	REFILL SETTING	-	PID WELL MOUTH	0 PPM
		DISCHARGE SETTING	-		

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY:

INTEGRITY:	YES	NO	N/A
CAP	—	—	—
CASING	—	—	—
LOCKED	—	—	—
COLLAR	—	—	—

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (+/- deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	% DO ~~(mg/L)~~	TURBIDITY (ntu)	REDOX (+/- mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
1143	Begin purging		-	Stop purging		after 30 S - well dry				
1153	-	-	16.72	0.213	5.82	55.9	833	57.0	7	YSI Cup
1220	Collect Sample			RI22-GP5060	1					

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	TYPE OF TUBING	TYPE OF PUMP MATERIAL	TYPE OF BLADDER MATERIAL
☐ BLADDER	☒ HIGH DENSITY POLYETHYLENE	☐ STAINLESS STEEL	☐ TEFLON
☒ PERISTALTIC ☐ OTHER _____	☐ OTHER _____	☐ OTHER _____	☐ OTHER _____

ANALYTICAL PARAMETERS

ANALYSIS	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
VOC	8260	HCl	3x40mL	✓	RI22-GP5060 1
Total Pb	6010	HNO_3	1x500mL	✓	" (FM)
Dissolved Pb	6010	HNO_3	1x500mL	✓	"

PURGE OBSERVATIONS: no odor or sheen

PURGE WATER CONTAINERIZED (YES) NO

NOTES:

SIGNATURE: _____

CKED BY: _____

LOW FLOW GROUNDWATER DATA RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

JOB NUMBER 361804B122

PROJECT 94th RRC, Lincoln RI | FIELD SAMPLE NUMBER GP-07 | EVENT NO. —

SITE ID Site 04 | SITE TYPE — | DATE 5.9.07

ACTIVITY START 1440 END 1540 | SAMPLE TIME 1455 | FILE TYPE —

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: ☐ TOP OF WELL RISER ☐ TOP OF PROTECTIVE CASING ☑ ground

INITIAL DEPTH TO WATER	4.5 FT	PROTECTIVE CASING STICKUP (FROM GROUND)	— FT	CASING / WELL DIFFERENCE	— FT
FINAL DEPTH TO WATER	dry FT	HISTORICAL WELL DEPTH (TOR)	8.7 FT	PID AMBIENT AIR	0 PPM	WELL DIAMETER	1 IN
SCREEN LENGTH	5 FT	PRESSURE TO PUMP	— PSI	PID WELL MOUTH	0 PPM	WELL INTERGRITY:	
TOTAL VOL. PURGED	GAL	REFILL SETTING	—	DISCHARGE SETTING	—		

INTEGRITY:	YES	NO	N/A
CAP	—	—	—
CASING	—	—	—
LOCKED	—	—	—
COLLAR	—	—	—

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (+/- deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	% DO (mg/L)	TURBIDITY (ntu)	REDOX (+/- mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
1445	Begin purging @			300 ml/min		—	—			
1448	well is dry									
1455	Collect Sample			RI22-GPS0701						
1538	dry	—	22.75	0.057	6.10	89.3	552	93.6	8	in YSI cup

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	TYPE OF TUBING	TYPE OF PUMP MATERIAL	TYPE OF BLADDER MATERIAL
☐ BLADDER	☑ HIGH DENSITY POLYETHYLENE	☐ STAINLESS STEEL	☐ TEFLON
☑ PERISTALTIC ☐ OTHER _____	☐ OTHER _____	☐ OTHER _____	☐ OTHER _____

ANALYTICAL PARAMETERS

ANALYSIS	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
VOC	8260	HCl	3 x 40mL	✓	RI22-GPS0701
Total Pb	6010	HNO_3	1 x 500mL	✓	"
Dissolved Pb	6010	HNO_3	1 x 500mL	✓	"

PURGE OBSERVATIONS: no sheen or odor

PURGE WATER CONTAINERIZED (YES) NO _____

NOTES:

SIGNATURE: _____

CHECKED BY: _____

LOW FLOW GROUNDWATER DATA RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004

MACTEC, Inc.

APPENDIX C-3

SOIL BORING LOGS - BRIGGS ASSOCIATES, 1986

BRIGGS

TOWN Lincoln R. I.
PROJECT NAME Albion St., 94th ARCOM
PROJECT NO. 70683

SHEET 1 OF 1
LOCATION
HOLE NO. B-1, O.W.
LINE & STA.
OFFSET

GROUNDWATER OBSERVATIONS

At 3.8' ft. after 18 Hours
At ___ ft. after ___ Hours

	CASING	SAMPLER	CORE BAR.
Type	Auger	SS	
Size I.D.	2-1/2"	1-3/8"	
Hammer Wt.		140 lbs.	BIT
Hammer Fall		30"	

SURFACE ELEV.
DATE START: 8-26-86
DATE FINISH 8-26-86
BORING FOREMAN C. Bell
INSPECTOR

LOCATION OF BORING:

Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	18-24	Strata Change Depth Elev.	Field Identification of Soil. Remarks (incl. color, loss of wash water, seams in rock, etc.)	SAMPLE No.	Pen	Rec.
	0.5 - 2.5'	SS	2	4	8	17	1.0'	Moist, loose, TOPSOIL	1	24"	16"
	4.5 - 6.0'	SS	9	19	30			Moist to wet, dense, fine/medium light brown sand, little silt, trace of fine/coarse gravel, cobbles and small boulders	2	18"	15"
	9.5 - 11.0'	SS	15	17	21				3	18"	18"
	14.5 - 16.0'	SS	21	23	30				4	18"	18"
	19.5 - 20.0'	SS	15	100/0"			20.0'		5	6"	0"
								Bottom of Boring at 20.0' Refusal NOTE: Observation well tip set at 19.5', 15' screen, seal at 2'-3'			

BLOW COUNTS FOR CLAY
< 2 Very Soft
2-4 Soft
5-8 Medium
9-15 Stiff
16-30 Very Stiff
> 30 Hard

BLOW COUNTS FOR GRANULAR MATERIAL
< 4 Very Loose
5-10 Loose
11-30 Medium
31-50 Dense
> 50 Very Dense

Proportion used: trace = 0 - 10% little = 10 - 20% some = 20 - 35% and = 35 - 50%

BRIGGS

TOWN Lincoln, R. I.
PROJECT NAME Albion St., 94th ARCOM
PROJECT NO. 70683

SHEET 1 OF 1
LOCATION
HOLE NO. B-2-O.W.
LINE & STA.
OFFSET

GROUNDWATER OBSERVATIONS
At 4.6' ft. after 18 Hours
At ___ ft. after ___ Hours

	CASING	SAMPLER	CORE BAR.
Type	Auger	SS	
Size I.D.	3"	1-3/8"	
Hammer Wt.		140 lbs.	BIT
Hammer Fall		30"	

SURFACE ELEV.
DATE START: 8-27-86
DATE FINISH 8-27-86
BORING FOREMAN C. Reil
INSPECTOR

LOCATION OF BORING:

Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	18-24	Strata Change Depth Elev.	Field Identification of Soil, Remarks (incl. color, loss of wash water, seams in rock, etc.)	SAMPLE No.	Pen.	Rec.
	0.5 - 2.0'	SS	3	4	4		1.0'	Moist, loose TOPSOIL	1	18"	14"
							2.0'	Dry, loose, fine/medium brown sand, little silt, trace fine/coarse gravel, (Subsoil)			
	5.0 - 6.5'	SS	26	31	33			Moist to wet, dense, fine/coarse light brown sand, little silt, trace of fine/coarse gravel, cobbles and small boulders	2	18"	15"
	10.0 - 11.5'	SS	18	52	23		11.0'		3	18"	16"
								Wet, dense, fine light brown silty sand, trace of coarse gravel and cobbles			
	15.0 - 16.5'	SS	13	18	25				4	18"	17"
							18.0'				
								Wet, very dense, fine/coarse light brown sand, little silt, trace fine/			
	20.0 - 20'4"	SS	110/4"				20'4"	coarse gravel and cobbles	5	4"	3"
								Bottom of Boring at 20'4" Refusal			
								NOTE: Observation Well tip set at 19.5', 15' screen, seal at 2'-3'			

BLOW COUNTS FOR CLAY
< 2 Very Soft
2-4 Soft
5-8 Medium
9-15 Stiff
16-30 Very Stiff
> 30 Hard

BLOW COUNTS FOR GRANULAR MATERIAL
< 4 Very Loose
5-10 Loose
11-30 Medium
31-50 Dense
> 50 Very Dense

Proportion used: trace = 0 - 10% little = 10 - 20% some = 20 - 35% and = 35 - 50%

BRIGGS

TOWN Lincoln, R. I.
PROJECT NAME Albion St., 94th ARCOM
PROJECT NO. 70583

SHEET 1 OF 1
LOCATION
HOLE NO. B-3-O.W.
LINE & STA.
OFFSET

GROUNDWATER OBSERVATIONS
At 3' ft. after 18 Hours
At ___ ft. after ___ Hours

	CASING	SAMPLER	CORE BAR.
Type	Auger & Hd	SS	
Size I.D.	3" 4"	1-3/8"	
Hammer Wt.	300 lbs.	140 lbs.	BIT
Hammer Fall	24"	30"	

SURFACE ELEV.
DATE START: 8-27-86
DATE FINISH 8-28-86
BORING FOREMAN C. Reil
INSPECTOR

LOCATION OF BORING:

Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	12-18	18-24	Strata Change Depth Elev.	Field Identification of Soil. Remarks (incl. color, loss of wash water, seams in rock, etc.)	SAMPLE No.	Pen	Rec.
	0.5 - 2.0'	SS	2	5	2		1.0'	Moist, loose TOPSOIL	1	18"	12"
							2.0'	Wet, loose fine/medium brown silty sand, trace fine/coarse gravel and cobbles			
	5.0 - 6.5'	SS	16	19	19			Moist, to wet, dense, light brown to grey, fine/medium sand, some silt, little fine/coarse gravel and cobbles, trace of small boulders	2	18"	15"
	10.0 - 11.5'	SS	23	18	21				3	18"	16"
	15.0 - 16.5'	SS	35	41	40				4	18"	16"
	19.5'	SS	100/0"				19.5'		5	0"	
								Bottom of Boring at 19.5' Refusal NOTE: Observation well tip set at 18.5', screen 15', seal at 2'-3'			

BLOW COUNTS FOR CLAY
2 Very Soft 9-15 Stiff
2-4 Soft 16-30 Very Stiff
5-8 Medium > 30 Hard

BLOW COUNTS FOR GRANULAR MATERIAL
< 4 Very Loose 31-50 Dense
5-10 Loose > 50 Very Dense
11-30 Medium

Proportion used: trace = 0 - 10% little = 10 - 20% some = 20 - 35% and = 35 - 50%

BRIGGS

TOWN Lincoln R. I.
PROJECT NAME Albion St., 94th ARCOM
PROJECT NO. 70683

SHEET 1 OF 1
LOCATION
HOLE NO. B-4-O.W.
LINE & STA.
OFFSET

GROUNDWATER OBSERVATIONS

At 2.6' ft. after 90 Hours
At ___ ft. after ___ Hours

	CASING	SAMPLER	CORE BAR.
Type	Auger HW	SS	
Size I.D.	2-1/2" 4"	1-3/8"	
Hammer Wt.	300 lbs.	140 lbs.	BIT
Hammer Fall	24"	30"	

SURFACE ELEV.
DATE START: 8-28-86
DATE FINISH 8-29-86
BORING FOREMAN C. Reil
INSPECTOR

LOCATION OF BORING:

Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	18-24	Strata Change Depth Elev.	Field Identification of Soil, Remarks (incl. color, loss of wash water, stems in rock, etc.)	SAMPLE No.	Pen.	Rec.
	0.0 - 2.0'	SS	1	4	3	7	1.5'	Moist, loose, TOPSOIL, and silt, mixed trace of sand and gravel	1	24"	16"
	4.5 - 6.0'	SS	13	20	24		7.0'	Moist to wet, dense, fine/coarse brown sand, little fine/coarse gravel cobbles and small boulders	2	18"	14"
	10.0 - 11.5'	SS	9	18	18		14.5'	Wet, dense, fine/medium brown silty sand, trace of fine gravel and coarse sand	3	18"	14"
	15.0 - 16.5'	SS	67	92	120		16.0'	Wet, very dense, fine/coarse brown sand, little silt, trace fine/coarse gravel and cobble	4	18"	12
	18.0'	SS	100/0 "					Bottom of Boring at 18' Refusal	5	0"	

NOTE: Observation well tip set at 15', 10' screen, seal at 2'-3'

BLOW COUNTS FOR CLAY

< 2 Very Soft
2-4 Soft
5-8 Medium
9-15 Stiff
16-30 Very Stiff
> 30 Hard

BLOW COUNTS FOR GRANULAR MATERIAL

< 4 Very Loose
5-10 Loose
11-30 Medium
31-50 Dense
> 50 Very Dense

Proportion used: trace = 0 - 10% little = 10 - 20% some = 20 - 35% and = 35 - 50%

BRIGGS

TOWN Lincoln R.I.
PROJECT NAME Albion St., 94th ARCOM
PROJECT NO. 70683

SHEET 1 OF 1
LOCATION
HOLE NO. B-5-O.W.
LINE & STA.
OFFSET

GROUNDWATER OBSERVATIONS

At 4' ft. after 18 Hours
At ___ ft. after ___ Hours

	CASING		SAMPLER	CORE BAR.
Type	Auger	HW	SS	
Size I.D.	2-1/2"	4"	1-3/8"	
Hammer Wt.	300 lbs.		140 lbs.	
Hammer Fall	24"		30"	

SURFACE ELEV.
DATE START: 8-29-86
DATE FINISH 9-2-86
BORING FOREMAN C. Rell
INSPECTOR

LOCATION OF BORING:

Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From / To 0-6	6-12	12-18	18-24	Strata Change Depth Elev.	Field Identification of Soil. Remarks (incl. color, loss of wash water, seams in rock, etc.)	SAMPLE No.	Pen	Rec.
	0.0 - 2.0'	SS	3	7	11	9		Moist, medium, fine/coarse black brown and green sand, trace of fine/	1	24"	13"
							3.0'	coarse gravel and silt, Oil and Foreign odor			
	4.5 - 6.0'	SS	21	25	29			Moist to wet, dense fine/coarse brown sand, trace to little fine/ coarse gravel, trace of cobbles	2	18"	15"
	9.5 - 11.0'	SS	13	19	25				3	18"	0"
									NOTE I		
	14.5 - 16.0'	SS	15	29	34		15.0'		4	18"	15"
								Wet, dense, fine silty brown sand, trace of fine gravel			
	19.3'	SS	100/0	"			19.3'		5	0"	
								Bottom of Boring at 19.3' Refusal			
								NOTE I: Redrove spoon to 12' for sample			
								NOTE II: Observation Well tip set at 18'9", 15' screen, seal at 2'-3'			

BLOW COUNTS FOR CLAY

< 2 Very Soft
2-4 Soft
5-8 Medium
9-15 Stiff
16-30 Very Stiff
> 30 Hard

BLOW COUNTS FOR GRANULAR MATERIAL

< 4 Very Loose
5-10 Loose
11-30 Medium
31-50 Dense
> 50 Very Dense

Proportion used: trace = 0 - 10% little = 10 - 20% some = 20 - 35% and = 35 - 50%

BRIGGS

TOWN: Lincoln R. I.
PROJECT NAME: Albion St. 94th ARCOM
PROJECT NO.: 70683

SHEET 1 OF 1
LOCATION
HOLE NO. B - 1
LINE & STA.
OFFSET

GROUNDWATER OBSERVATIONS

At 6' ft. after 18 Hours
At ____ ft. after ____ Hours

	CASING	SAMPLER	CORE BAR.
Type	Auger	SS	
Size I.D.	2-1/2"	1-3/8"	
Hammer Wt.		140 lbs.	BIT
Hammer Fall		30"	

SURFACE ELEV.
DATE START: 9-2-86
DATE FINISH 9-2-86
BORING FOREMAN C. Reil
INSPECTOR

LOCATION OF BORING:

Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	12-18	18-24	Strata Change Depth Elev.	Field Identification of Soil, Remarks (incl. color, loss of wash water, seams in rock, etc.)	SAMPLE No.	Pen	Rec.
	0.0 - 2.0'	SS	2	4	13	4		Moist, loose, fine/medium brown sand little black silt, trace of silt,	1	24"	14"
							3.0'	medium/coarse gravel and cobbles			
	4.5 - 6.0'	SS	30	31	38			Moist to wet, dense fine/medium brown sand, some silt, trace coarse	2	18"	15"
							7.0'	sand, fine/medium gravel & cobbles			
	9.5 - 11.0'	SS	8	16	24			Wet, dense to medium fine brown silty sand, trace of fine gravel	3	18"	18"
	14.5 - 16.0'	SS	4	8	15				4	18"	0"
									NOTE 1		
	19.5 - 19.75'	SS	100/3"				19'9"		5	3"	0"
								Bottom of Boring at 19'9", Refusal			
								NOTE 1: Redrove spoon to 16.5' for Sample			

BLOW COUNTS FOR CLAY

< 2 Very Soft
2-4 Soft
5-8 Medium
9-15 Stiff
16-30 Very Stiff
> 30 Hard

BLOW COUNTS FOR GRANULAR MATERIAL

< 4 Very Loose
5-10 Loose
11-30 Medium
31-50 Dense
> 50 Very Dense

Proportion used: trace = 0 - 10% little = 10 - 20% some = 20 - 35% and = 35 - 50%

BRIGGS

TOWN Lincoln R. I.
PROJECT NAME Albion St., 94th ARCOM
PROJECT NO. 70683

SHEET 1 OF 1
LOCATION
HOLE NO. B - 2
LINE & STA.
OFFSET

GROUNDWATER OBSERVATIONS
At 4' ft. after 3 Hours
At ___ ft. after ___ Hours

	CASING	SAMPLER	CORE BAR.
Type	Auger	SS	
Size I.D.	2-1/2"	1-3/8"	
Hammer Wt.		140 lbs.	BIT
Hammer Fall		30"	

SURFACE ELEV.
DATE START: 9-2-86
DATE FINISH 9-3-86
BORING FOREMAN C. Reil
INSPECTOR

LOCATION OF BORING:

Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sample From 0-6	6-12	12-18	To 18-24	Strata Change Depth Elev.	Field Identification of Soil, Remarks (incl. color, loss of wash water, stains in rock, etc.)	SAMPLE No.	Pen	Rec.
	0.0 - 2.0'	SS	1	8	10	11	0.5'	Moist, loose TOPSOIL	1	24"	16"
							2.5'	Moist, medium mixed brown and black silt, sand and gravel			
	4.5 - 6.0'	SS	9	15	32			Moist to wet, dense fine/coarse brown and grey sand, little to some silt, trace of fine/medium gravel and cobbles	2	18"	15"
							7.0'				
	9.5 - 11.0'	SS	7	11	13			Wet, medium fine/coarse grey sand, trace of silt and fine/medium gravel ? septic odor	3	18"	16"
							12.5'				
	14.5 - 16.0'	SS	17	23	24			Wet, dense fine/coarse grey sand some fine/medium gravel, trace to little silt, trace of cobbles	4	18"	13"
							18.0'				
	19.5 - 20.5'	SS	102	117				Moist, very dense, brown decayed granite, little silt mixed	5	12"	9"
							20.5'				
								Bottom of Boring at 20.5' Refusal			

BLOW COUNTS FOR CLAY
0 - 2 Very Soft
2 - 4 Soft
5 - 8 Medium
9 - 15 Stiff
16 - 30 Very Stiff
> 30 Hard

BLOW COUNTS FOR GRANULAR MATERIAL
< 4 Very Loose
5 - 10 Loose
11 - 30 Medium
31 - 50 Dense
> 50 Very Dense

Proportion used: trace = 0 - 10% little = 10 - 20% some = 20 - 35% and = 35 - 50%

BRIGGS

TOWN Lincoln R. I.
PROJECT NAME Albion St.,94th ARCOM
PROJECT NO. 70683

SHEET 1 OF 1
LOCATION
HOLE NO. B - 3
LINE & STA.
OFFSET

GROUNDWATER OBSERVATIONS
At 5' ft. after 18 Hours
At ____ ft. after ____ Hours

	CASING	SAMPLER	CORE BAR.
Type	Auger	SS	
Size I.D.	2-1/2"	1-3/8"	
Hammer Wt.		140 lbs.	BIT
Hammer Fall		30"	

SURFACE ELEV.
DATE START: 9-3-86
DATE FINISH 9-3-86
BORING FOREMAN C. Reil
INSPECTOR

LOCATION OF BORING:

Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From - To 0-6	6-12	12-18	18-24	Strata Change Depth Elev.	Field Identification of Soil, Remarks (incl. color, loss of wash water, seams in rock, etc.)	SAMPLE No.	Pen	Rec.
							3"	ASPHALT			
	1.0 - 2.5'	SS	9	16	15		1.5'	NOTE II	1	18"	14"
	4.5 - 6.0'	SS	3	15	32		7.0'	Moist to wet, dense, fine/medium brown sand, little silt and fine/ medium gravel	2	18"	14"
	9.5 - 11.0'	SS	11	20	19			Wet, dense fine light brown silty sand, trace of fine/medium gravel and cobbles	3 NOTE I	18"	0"
	14.5 - 16.0'	SS	38	85	109		15.0'		4	18"	
							16.0'	Wet, very dense, fine/coarse, light brown sand, little silt & fine/medium gravel			
								Bottom of Boring at 16.0' Refusal			

NOTE I: Redrove spoon to 11.5' for sample

NOTE II; dry, medium fine/medium brown sand, little fine/coarse gravel, trace of silt & cobbles

BLOW COUNTS FOR CLAY
< 2 Very Soft
2-4 Soft
5-8 Medium
9-15 Stiff
16-30 Very Stiff
> 30 Hard

BLOW COUNTS FOR GRANULAR MATERIAL
< 4 Very Loose
5-10 Loose
11-30 Medium
31-50 Dense
> 50 Very Dense

Proportion used: trace = 0 - 10% little = 10 - 20% some = 20 - 35% and = 35 - 50%

BRIGGS

TOWN Lincoln R.I.
PROJECT NAME Albion St. 94th ARCOM
PROJECT NO. 70683

SHEET 1 OF 1
LOCATION
HOLE NO. B - 4
LINE & STA.
OFFSET

GROUNDWATER OBSERVATIONS

At 5'3" ft. after 3 Hours
At ____ ft. after ____ Hours

	CASING	SAMPLER	CORE BAR.
Type	Auger	SS	
Size I.D.	2-1/2"	1-3/8"	
Hammer Wt.		140 lbs.	BIT
Hammer Fall		30"	

SURFACE ELEV.
DATE START: 9-3-86
DATE FINISH 9-4-86
BORING FOREMAN C. Bell
INSPECTOR

LOCATION OF BORING:

Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	18-24	Strata Change Depth Elev.	Field Identification of Soil, Remarks (incl. color, loss of wash water, seams in rock, etc.)	SAMPLE No.	Pen	Rec.
	0.5 - 2.0'	SS	14	85	96		3"	ASPHALT	1	18"	13"
							2.0'	NOTE I			
	4.5 - 6.0'	SS	15	20	20			Dry, dense, fine/medium, light brown sand, little to some silt, little fine/coarse gravel, trace of cobbles	2	18"	14"
							7.0'				
	9.5 - 11.0'	SS	14	20	20			Wet, dense, fine/medium, light brown sand, little to some silt, little fine/coarse gravel, trace of cobbles	3	18"	17"
	14.5 - 16.0'	SS	32	45	48		15.0'		4	18"	17"
								Moist, very dense, fine/coarse, light brown sand, little fine/coarse gravel and silt, trace of cobbles			
	19.5 - 20.75'	SS	28	72	100/3"		20.0'		5	15"	15"
							20.75'	NOTE II			
								Bottom of Boring at 20.75' Refusal NOTE 1: dry, very dense, fine/coarse brown sand, some fine/coarse gravel, trace of cobbles. NOTE II: Weathered granite			

BLOW COUNTS FOR CLAY

2 Very Soft
2-4 Soft
5-8 Medium
9-15 Stiff
16-30 Very Stiff
> 30 Hard

BLOW COUNTS FOR GRANULAR MATERIAL

< 4 Very Loose
5-10 Loose
11-30 Medium
31-50 Dense
> 50 Very Dense

Proportion used: trace = 0 - 10% little = 10 - 20% some = 20 - 35% and = 35 - 50%

BRIGGS

TOWN Lincoln R. I.
PROJECT NAME Albion St., 94th ARCOM
PROJECT NO. 70683

SHEET 1 OF 1
LOCATION
HOLE NO. B - 5
LINE & STA.
OFFSET

GROUNDWATER OBSERVATIONS
At 3'3" ft. after 1 Hours
At ____ ft. after ____ Hours

	CASING	SAMPLER	CORE BAR.
Type	Auger	SS	
Size I.D.	2-1/2"	1-3/8"	
Hammer Wt.		140 lbs.	BIT
Hammer Fall		30"	

SURFACE ELEV.
DATE START: 9-4-86
DATE FINISH 9-4-86
BORING FOREMAN C. Reil
INSPECTOR

LOCATION OF BORING:

Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	12-18	18-24	Strata Change Depth Elev.	Field Identification of Soil. Remarks (incl. color, loss of wash water, seams in rock, etc.)	SAMPLE No.	Pen	Rec.
	1.0 - 3.0'	SS	3	4	3	2	3.5'	Moist, loose, mixed brown and black silty sand, trace of fine/coarse gravel and cobbles	1	24"	13"
	4.5 - 6.0'	SS	11	22	23			Moist to wet, dense to medium, fine/coarse grey sand, little to some fine/coarse gravel and silt, trace of cobbles	2	18"	13"
	9.5' - 11.0'	SS	7	13	14				3	18"	16"
	14.5 - 16.0'	SS	9	16	19				4	18"	17
	19.5 - 20'4"	SS	29	100/4"			20.0'		5	10"	9"
							20'4"	Weathered Granite			
								Bottom of Boring at 20'4"			
								NOTE: Gas odor in #1 and #2 samples ? Septic odor in #3 and #4 samples			

BLOW COUNTS FOR CLAY
< 2 Very Soft
2-4 Soft
5-8 Medium
9-15 Stiff
16-30 Very Stiff
> 30 Hard

BLOW COUNTS FOR GRANULAR MATERIAL
< 4 Very Loose
5-10 Loose
11-30 Medium
31-50 Dense
> 50 Very Dense

Proportion used: trace = 0 - 10% little = 10 - 20% some = 20 - 35% and = 35 - 50%

APPENDIX D

MONITORING WELL CONSTRUCTION DIAGRAMS

MONITORING WELL CONSTRUCTION DIAGRAM

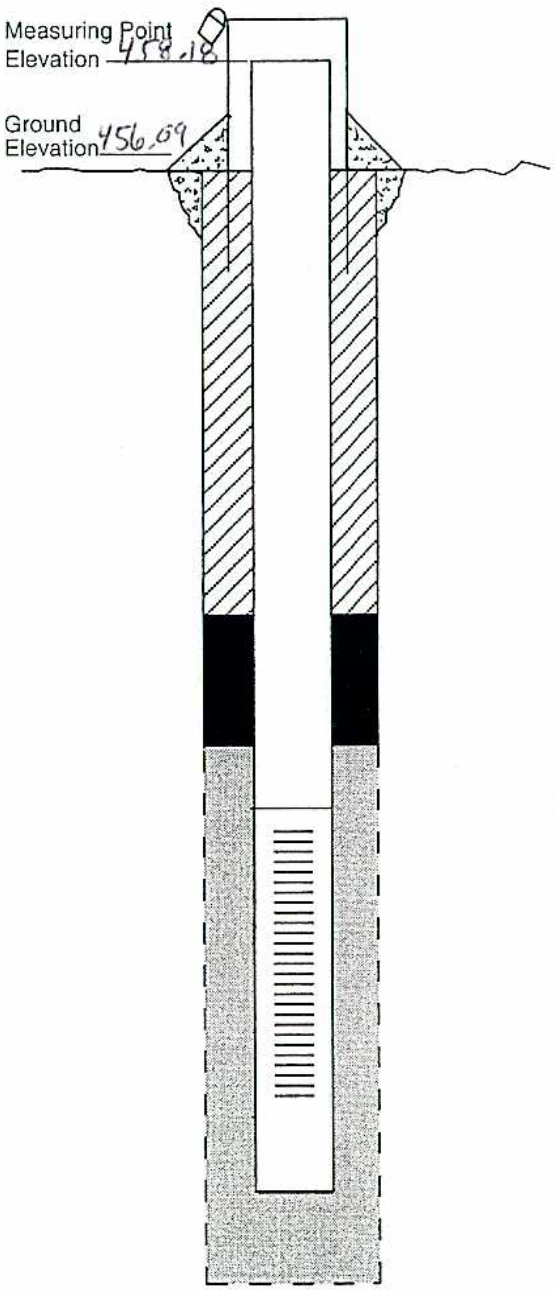
Project 94th Reg, Fed, Comm AOC MW-14 Driller Damien Jacobs - Geologic

Project No. 361804B122 Boring No. SS-01 Drilling Method Geoprobe

Date Installed 1/24/06 Development Method Peristaltic pump

Field Technician: Conan Gill Latitude: _____ Longitude: _____

Checked By: PSM



Stick-up of Casing Above Ground Surface: 2.5'

Type of Surface Seal/Other Protection: Concrete

Type of Surface Casing: Steel

ID of Surface Casing: 2"

Diameter of Borehole: 2"

Riser Pipe ID: 1"

Type of Riser Pipe: Sch. 40 PVC

Type of Backfill: N/A

Depth of Top of Seal: 6"

Type of Seal: Bentonite Chips

Depth of Top of Sand: 1'

Depth of Top of Screen: 2'

Type of Screen: Sch. 40 PVC

Slot Size x Length: 0.010" x 10'

ID of Screen: 1"

Type of Sandpack: #1

Depth of Bottom of Screen: 12'

Depth of Sediment Sump with Plug: 12' - 1"

Depth of Bottom of Borehole: 12'

MONITORING WELL CONSTRUCTION DIAGRAM
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC. Inc.

MONITORING WELL CONSTRUCTION DIAGRAM

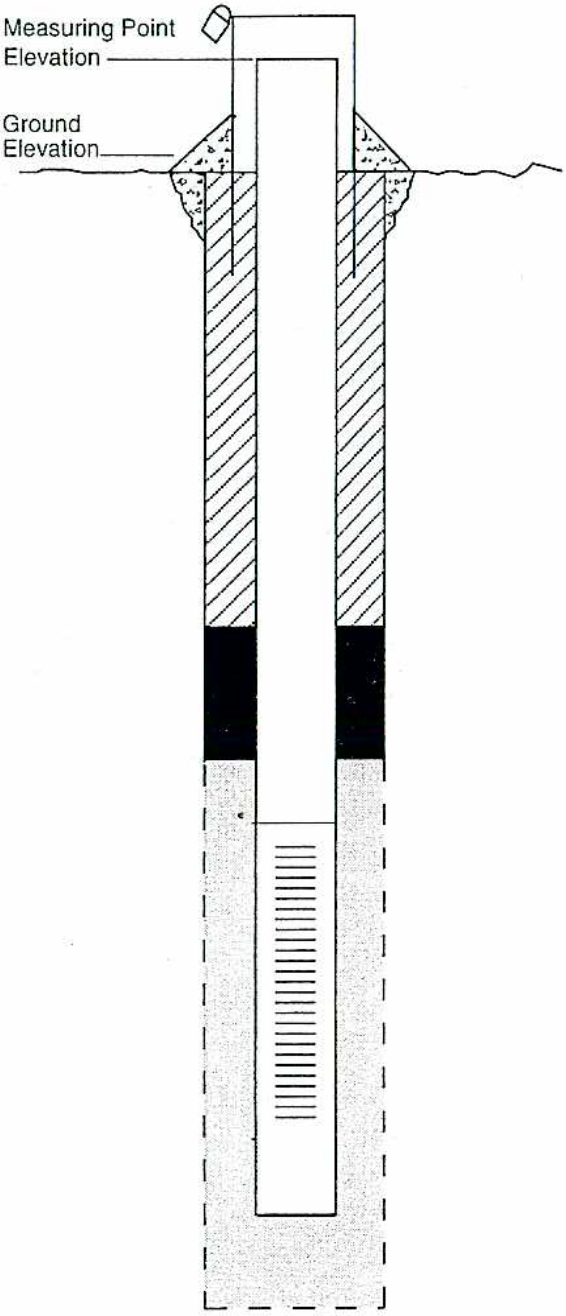
Project 94th RRC Lincoln, RI AOC Site 04 Driller Geologic

Project No. 361804.0122 Boring No. MW-14D Drilling Method Geoprobe

Date Installed 5.17.07 Development Method

Field Technician: PJM Latitude: Longitude:

Checked By:



Stick-up of Casing Above Ground Surface: N/A

Type of Surface Seal/Other Protection: Concrete

Type of Surface Casing: Steel

ID of Surface Casing: 3"

Diameter of Borehole: 2.25"

Riser Pipe ID: 1"

Type of Riser Pipe: PVC

Type of Backfill: #1 Sand

Depth of Top of Seal: 6'

Type of Seal: Bentonite

Depth of Top of Sand: 8'

Depth of Top of Screen: 10'

Type of Screen: PVC

Slot Size x Length: 0.010" x 10'

ID of Screen: 1"

Type of Sandpack: #1 Sand

Depth of Bottom of Screen: 20'

Depth of Sediment Sump with Plug: 20'

Depth of Bottom of Borehole: 20'

MONITORING WELL CONSTRUCTION DIAGRAM
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC. Inc.

MONITORING WELL CONSTRUCTION DIAGRAM

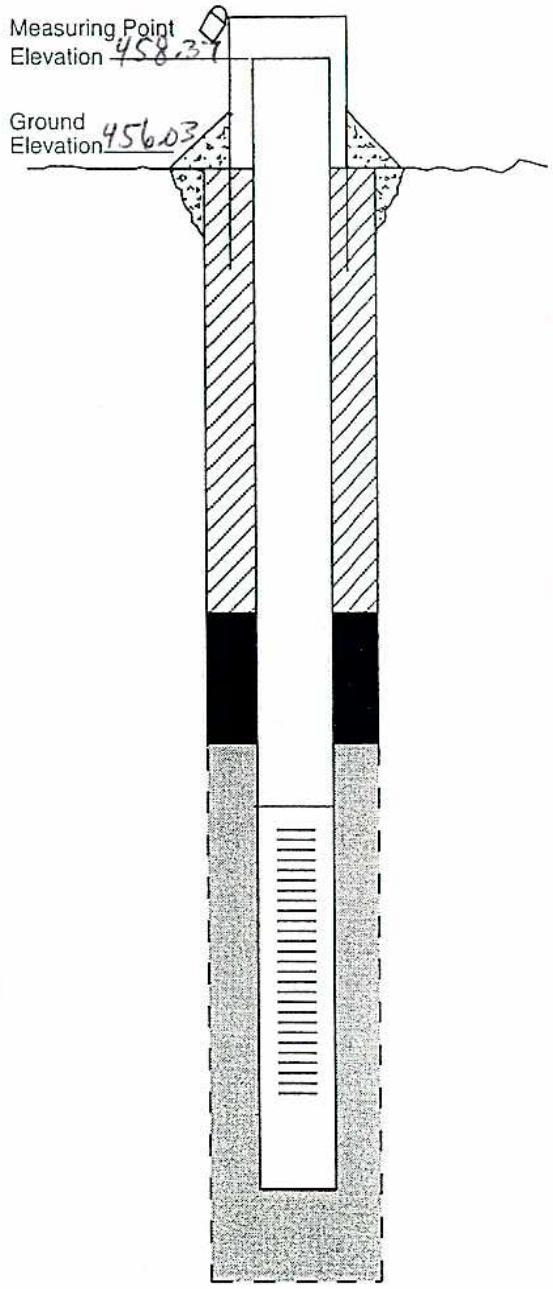
Project 94th Reg, Fed. Comm, AOC MW-15 Driller Damien Jacobs - Geologic

Project No. 3618048122 Boring No. SS-7 Drilling Method Geoprobe

Date Installed 1/25/06 Development Method peristaltic pump

Field Technician: Phil Muller Latitude: _____ Longitude: _____

Checked By: PJM



Stick-up of Casing Above Ground Surface: 2.5'

Type of Surface Seal/Other Protection: Cement

Type of Surface Casing: Steel

ID of Surface Casing: 2"

Diameter of Borehole: 2"

Riser Pipe ID: 1"

Type of Riser Pipe: Sch. 40 PVC

Type of Backfill: Natural collapse

Depth of Top of Seal: N/A

Type of Seal: None

Depth of Top of Sand: N/A

Depth of Top of Screen: 2'

Type of Screen: Sch. 40 PVC

Slot Size x Length: 0.010" x 10'

ID of Screen: 1"

Type of Sandpack: None

Depth of Bottom of Screen: 12'

Depth of Sediment Sump with Plug: 12' - 1"

Depth of Bottom of Borehole: 12'

MONITORING WELL CONSTRUCTION DIAGRAM
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC. Inc.

MONITORING WELL CONSTRUCTION DIAGRAM

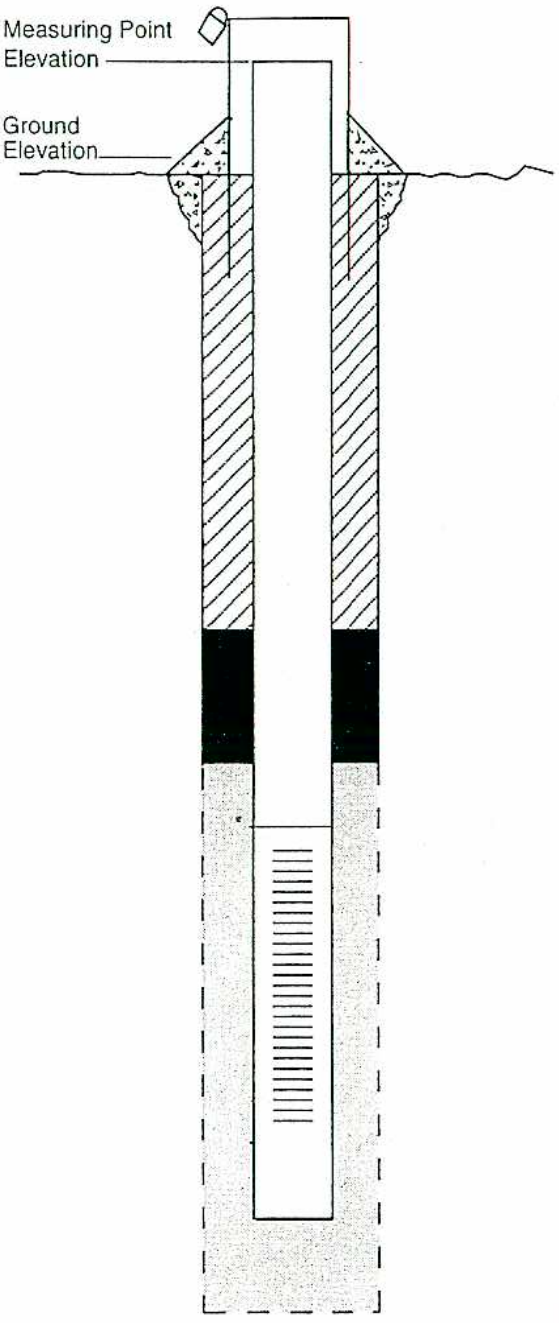
Project 94th RRC Lincoln, NE AOC Site 04 Driller Geologic

Project No. 361B048122 Boring No. MW-15D Drilling Method HSA

Date Installed 6.7.07 Development Method _____

Field Technician: PJM Latitude: _____ Longitude: _____

Checked By: _____



Stick-up of Casing Above Ground Surface: N/A

Type of Surface Seal/Other Protection: Concrete

Type of Surface Casing: Steel

ID of Surface Casing: 3"

Diameter of Borehole: 7" (3.25" auger)

Riser Pipe ID: 1"

Type of Riser Pipe: PVC

Type of Backfill: #1 Sand

Depth of Top of Seal: 7.2

Type of Seal: Bentonite

Depth of Top of Sand: 9.2

Depth of Top of Screen: 10.2

Type of Screen: PVC

Slot Size x Length: 0.010" x 5'

ID of Screen: 1"

Type of Sandpack: #1 Sand

Depth of Bottom of Screen: 15.2

Depth of Sediment Sump with Plug: 15.2

Depth of Bottom of Borehole: 15.5

Note: ~5-10 gal. water added to prevent blow-in

MONITORING WELL CONSTRUCTION DIAGRAM
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC. Inc.

MONITORING WELL CONSTRUCTION DIAGRAM

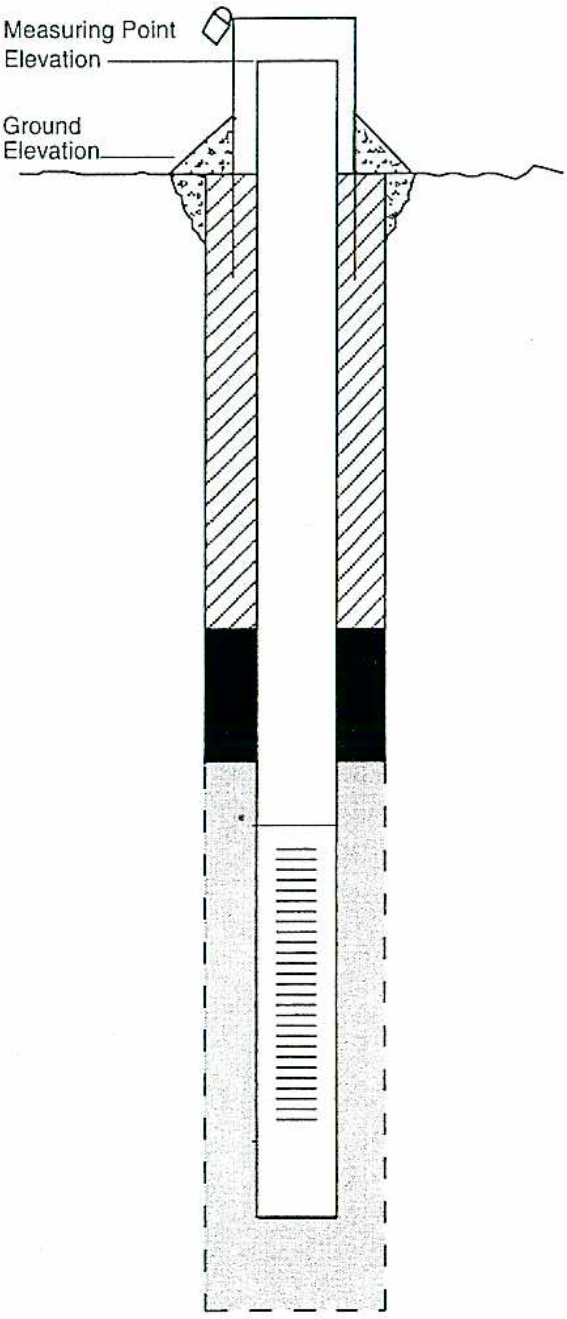
Project 94th RRC Lincoln AOC Site 04 Driller GeoLogic

Project No. 36180481228.02 Boring No. MW-20 Drilling Method Geoprobe

Date Installed 5 16 07 Development Method _____

Field Technician: TRH Latitude: _____ Longitude: _____

Checked By: _____



Stick-up of Casing Above Ground Surface: N/A Flushmount

Type of Surface Seal/Other Protection: Concrete

Type of Surface Casing: Steel

ID of Surface Casing: 3"

Diameter of Borehole: 3.25"

Riser Pipe ID: 1"

Type of Riser Pipe: PVC

Type of Backfill: Sand

Depth of Top of Seal: 1'

Type of Seal: Bentonite

Depth of Top of Sand: 1.75'

Depth of Top of Screen: 2'

Type of Screen: PVC

Slot Size x Length: .010 x 10'

ID of Screen: 1"

Type of Sandpack: #1

Depth of Bottom of Screen: 12'

Depth of Sediment Sump with Plug: 13'

Depth of Bottom of Borehole: 13'

MONITORING WELL CONSTRUCTION DIAGRAM
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004

MACTEC, Inc.

MONITORING WELL CONSTRUCTION DIAGRAM

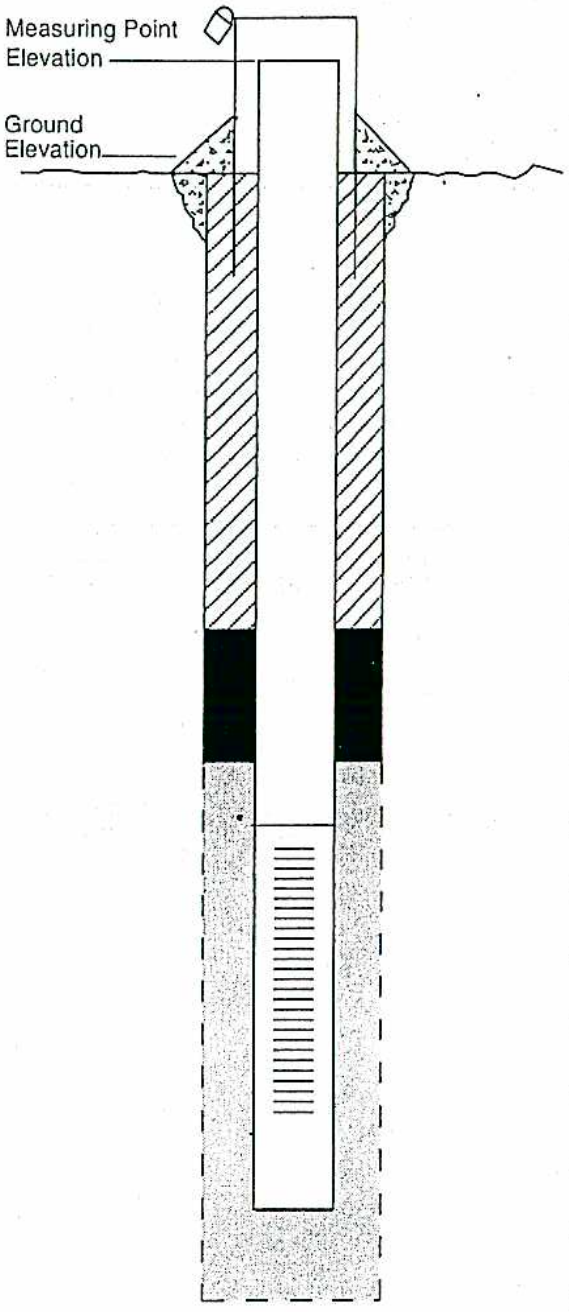
Project 94th RRC Lincoln, RI AOC Site 04 Driller Geologic

Project No. 361804.0122.02 Boring No. MW-20D Drilling Method Geoprobe

Date Installed 5.17.07 Development Method

Field Technician: PJM Latitude: Longitude:

Checked By:



Stick-up of Casing Above Ground Surface: N/A

Type of Surface Seal/Other Protection: Concrete

Type of Surface Casing: steel

ID of Surface Casing: 3"

Diameter of Borehole: 2.25"

Riser Pipe ID: 1"

Type of Riser Pipe: PVC

Type of Backfill: #1 Sand

Depth of Top of Seal: 7'

Type of Seal: Bentonite

Depth of Top of Sand: 9'

Depth of Top of Screen: 10'

Type of Screen: PVC

Slot Size x Length: 0.010" x 10'

ID of Screen: 1"

Type of Sandpack: #1 Sand

Depth of Bottom of Screen: 20'

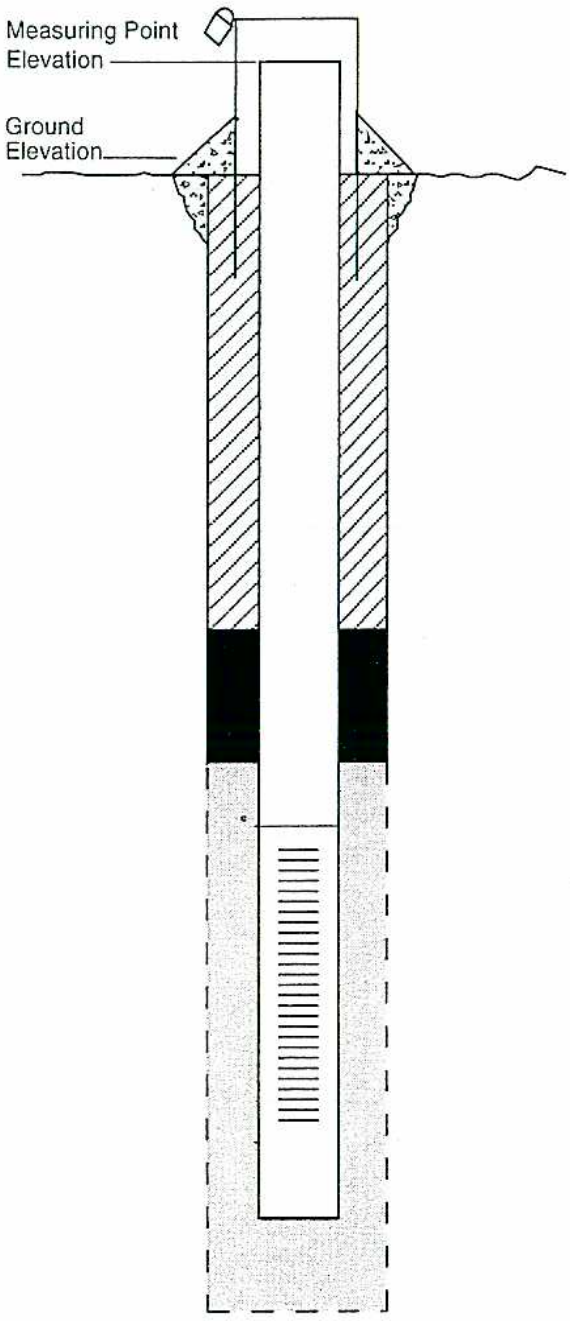
Depth of Sediment Sump with Plug: 20'

Depth of Bottom of Borehole: 20'

MONITORING WELL CONSTRUCTION DIAGRAM
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC. Inc.

MONITORING WELL CONSTRUCTION DIAGRAM

Project 94th RRC | AOC Site 04 | Driller Geo Logic
Project No. 36180481 28.02 | Boring No. MW-21 | Drilling Method Geoprobe
Date Installed 5 16 07 | Development Method
Field Technician: TKH | Latitude: | Longitude:
Checked By:



Stick-up of Casing Above Ground Surface: Flushmount
Type of Surface Seal/Other Protection: Concrete
Type of Surface Casing: Metal
ID of Surface Casing: 3"
Diameter of Borehole: 3.25
Riser Pipe ID: 1"
Type of Riser Pipe: PVC
Type of Backfill: Sand
Depth of Top of Seal: 0.75'
Type of Seal: Bentonite
Depth of Top of Sand: 1.5'
Depth of Top of Screen: 2'
Type of Screen: PVC
Slot Size x Length: .010 x 10'
ID of Screen: 1"
Type of Sandpack: #1 Sand
Depth of Bottom of Screen: 12'
Depth of Sediment Sump with Plug: 13'
Depth of Bottom of Borehole: 13'

MONITORING WELL CONSTRUCTION DIAGRAM
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC. Inc.

MONITORING WELL CONSTRUCTION DIAGRAM

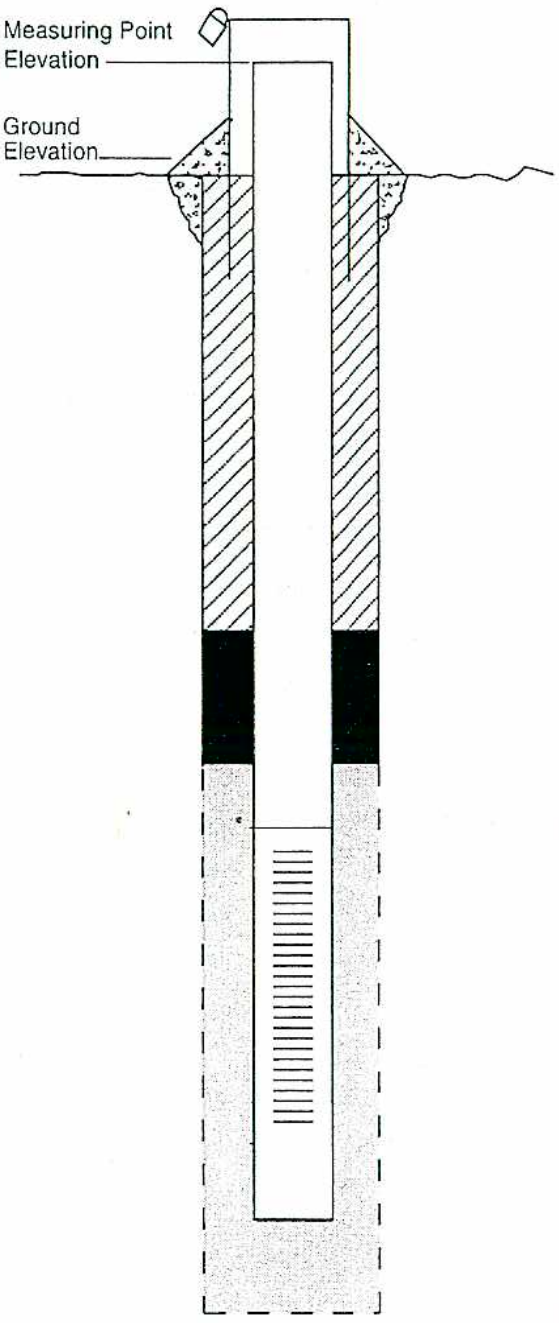
Project 94TH RRC Lincoln RI AOC Site 04 Driller Geologic

Project No. 36180481 22.02 Boring No. MW-21D Drilling Method HSA

Date Installed 6-7-07 Development Method _____

Field Technician: PJM Latitude: _____ Longitude: _____

Checked By: _____



Stick-up of Casing Above Ground Surface: N/A

Type of Surface Seal/Other Protection: concrete

Type of Surface Casing: (PM) concrete steel

ID of Surface Casing: 3"

Diameter of Borehole: 7" (3.25" augers)

Riser Pipe ID: 1"

Type of Riser Pipe: PVC

Type of Backfill: native soil

Depth of Top of Seal: 9.5'

Type of Seal: bentonite

Depth of Top of Sand: 11.5'

Depth of Top of Screen: 12.5'

Type of Screen: PVC

Slot Size x Length: 0.010" x 5'

ID of Screen: 1"

Type of Sandpack: #1 Sand

Depth of Bottom of Screen: 17.5'

Depth of Sediment Sump with Plug: 17.5'

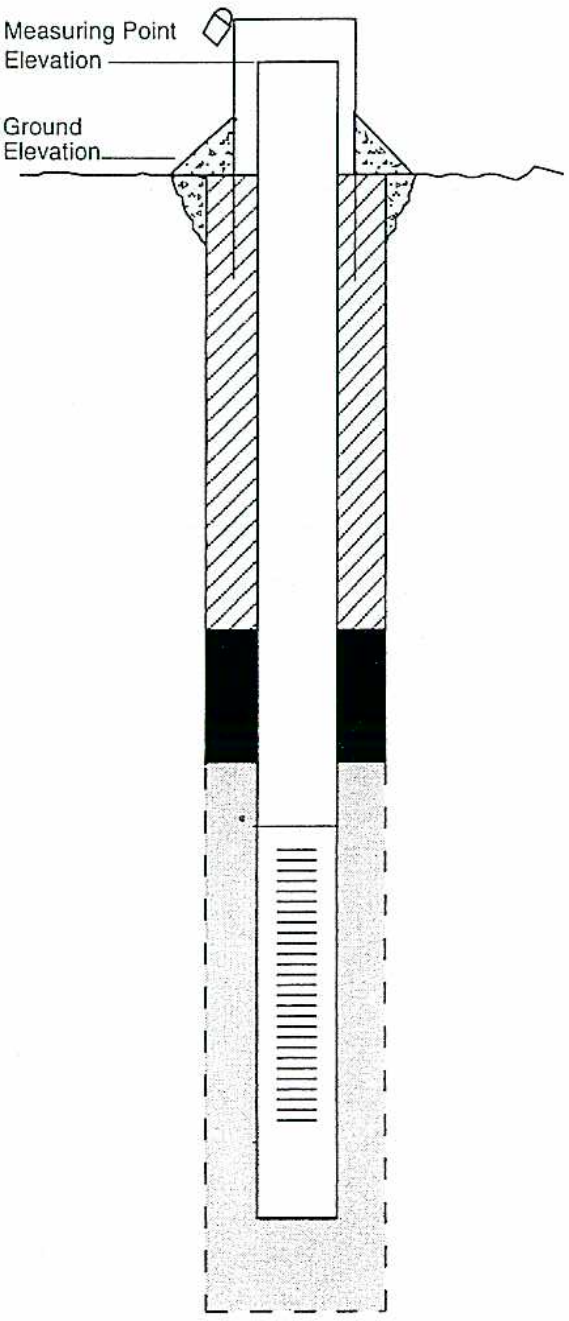
Depth of Bottom of Borehole: 17.5' refusal

Note: ~10 gal added to borehole to prevent blow-in.

MONITORING WELL CONSTRUCTION DIAGRAM
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC. Inc.

MONITORING WELL CONSTRUCTION DIAGRAM

Project 14 RRC Lincoln AOC Site 09 Driller Geologic
Project No. 361804812202 Boring No. MW-22 Drilling Method Geoprobe
Date Installed 5 16 07 Development Method
Field Technician: TRH Latitude: Longitude:
Checked By:



Stick-up of Casing Above Ground Surface: Flush
Type of Surface Seal/Other Protection: Concrete
Type of Surface Casing: METAL
ID of Surface Casing: 3"
Diameter of Borehole: 3.25"
Riser Pipe ID: 1"
Type of Riser Pipe: PVC
Type of Backfill: Sand
Depth of Top of Seal: 0.75'
Type of Seal: Bentonite
Depth of Top of Sand: 1.5'
Depth of Top of Screen: 2'
Type of Screen: PVC
Slot Size x Length: .010 x 10'
ID of Screen: 1"
Type of Sandpack: #1
Depth of Bottom of Screen: 12'
Depth of Sediment Sump with Plug: 12.5'
Depth of Bottom of Borehole: 12.5'

MONITORING WELL CONSTRUCTION DIAGRAM
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC. Inc.

MONITORING WELL CONSTRUCTION DIAGRAM

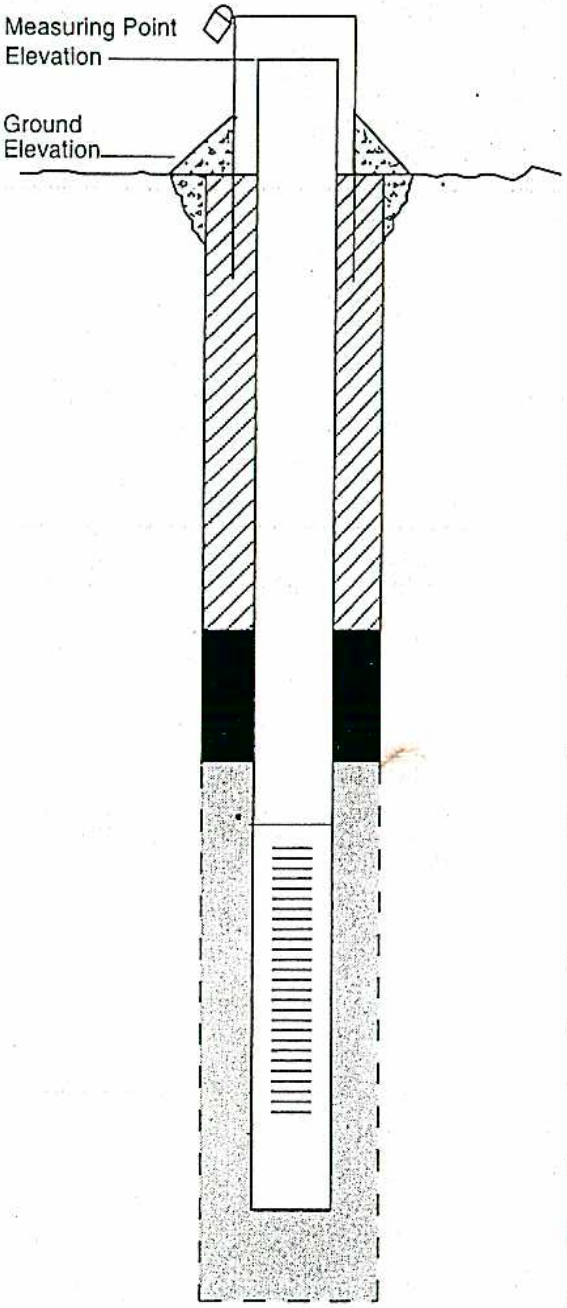
Project 94th RRC, Lincoln, RI AOC Site 04 Driller Geologic

Project No. 361804B122.02 Boring No. MW-22D Drilling Method HSA

Date Installed 6.8.07 Development Method

Field Technician: PJM Latitude: Longitude:

Checked By:



Stick-up of Casing Above Ground Surface: N/A

Type of Surface Seal/Other Protection: Concrete

Type of Surface Casing: steel

ID of Surface Casing: 3"

Diameter of Borehole: 7" (3.25" augers)

Riser Pipe ID: 1"

Type of Riser Pipe: PVC

Type of Backfill: native soil

Depth of Top of Seal: 9'

Type of Seal: Bentonite

Depth of Top of Sand: 11'

Depth of Top of Screen: 12'

Type of Screen: PVC

Slot Size x Length: 0.010" x 5'

ID of Screen: 1"

Type of Sandpack: #1 Sand

Depth of Bottom of Screen: 17'

Depth of Sediment Sump with Plug: 17'

Depth of Bottom of Borehole: 17' refusal

Note: ~10 gal water from hydrant added to bore hole during construction.

MONITORING WELL CONSTRUCTION DIAGRAM
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC. Inc.

MONITORING WELL CONSTRUCTION DIAGRAM

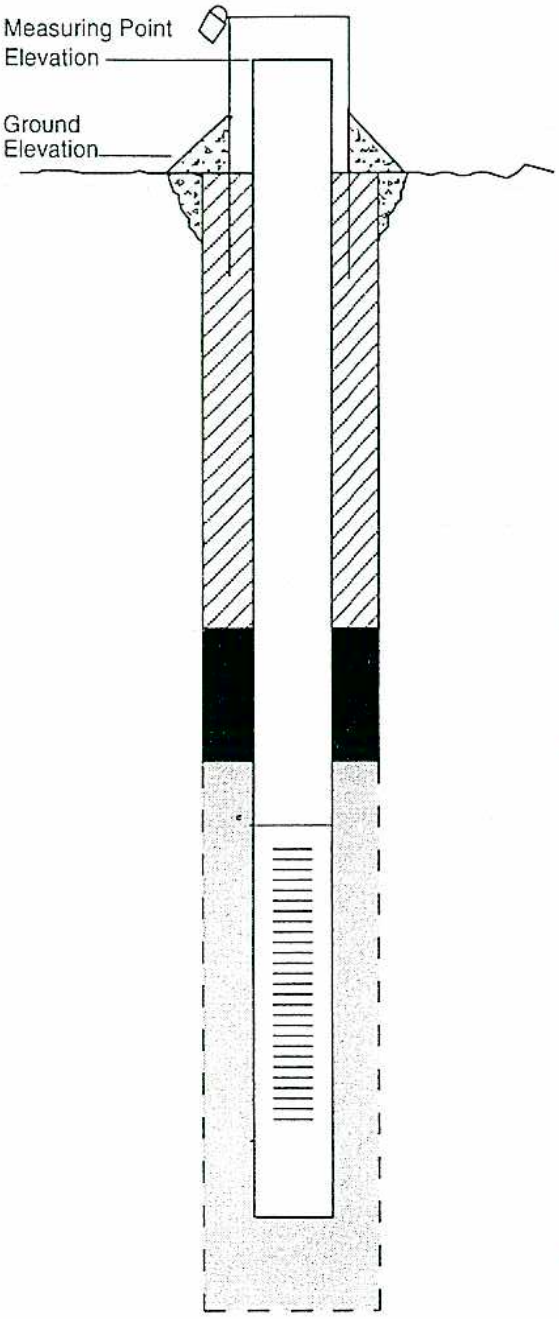
Project 94th RRC Lincoln, RI AOC Site 05 Driller Geologic

Project No. 361804B123 Boring No. MW-23 Drilling Method HSA

Date Installed 6.1.07 Development Method

Field Technician: PSM Latitude: Longitude:

Checked By:



Stick-up of Casing Above Ground Surface: N/A

Type of Surface Seal/Other Protection: Concrete

Type of Surface Casing: (PM) 3" Steel

ID of Surface Casing: 3"

Diameter of Borehole: (3.25" auger) 7" borehole

Riser Pipe ID: 1"

Type of Riser Pipe: PVC

Type of Backfill: #1 Sand

Depth of Top of Seal: 1'

Type of Seal: Bentonite

Depth of Top of Sand: 2'

Depth of Top of Screen: 2'

Type of Screen: PVC

Slot Size x Length: 0.010" x 10'

ID of Screen: 1"

Type of Sandpack: #1 Sand

Depth of Bottom of Screen: 12'

Depth of Sediment Sump with Plug: 12'

Depth of Bottom of Borehole: 13'

MONITORING WELL CONSTRUCTION DIAGRAM
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

MONITORING WELL CONSTRUCTION DIAGRAM

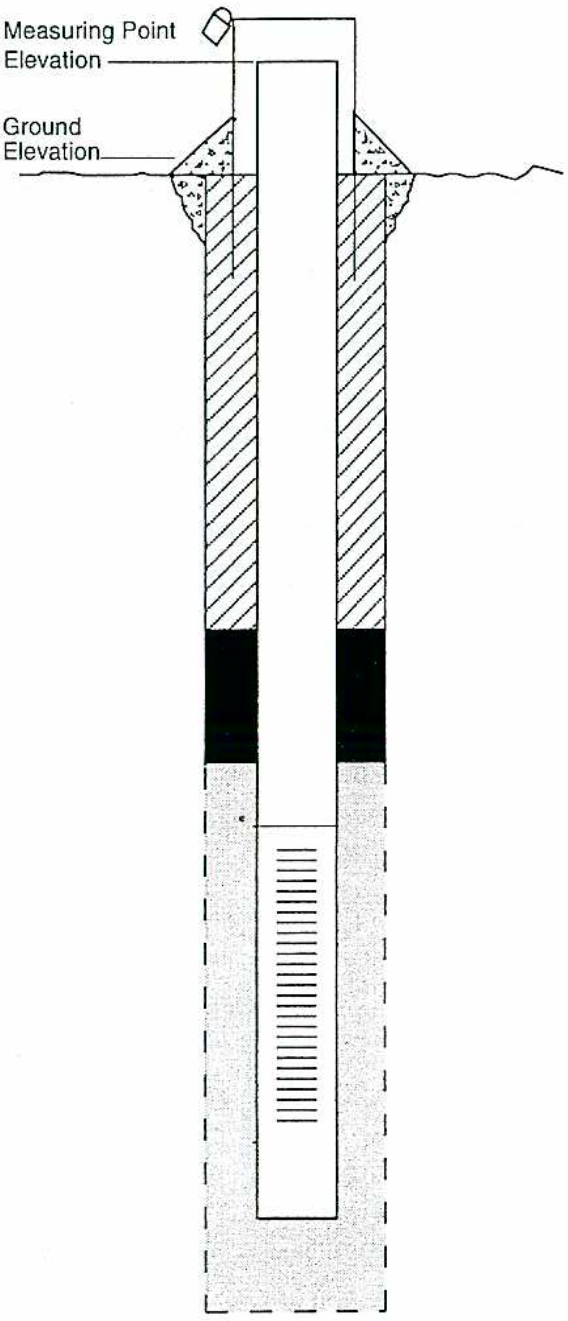
Project 94th RRC, Lincoln, RI AOC Site 04 Driller Geologic

Project No. 361808B122 Boring No. MW-24D Drilling Method Geoprobe

Date Installed 6·8·07 Development Method _____

Field Technician: BJM Latitude: _____ Longitude: _____

Checked By: _____



Stick-up of Casing Above Ground Surface: N/A

Type of Surface Seal/Other Protection: Concrete

Type of Surface Casing: steel

ID of Surface Casing: 2"

Diameter of Borehole: 2.25"

Riser Pipe ID: 1"

Type of Riser Pipe: PVC

Type of Backfill: #1 Sand

Depth of Top of Seal: 7'

Type of Seal: bentonite

Depth of Top of Sand: 9'

Depth of Top of Screen: 10'

Type of Screen: PVC

Slot Size x Length: 0.010" x 5'

ID of Screen: 1"

Type of Sandpack: #1 Sand

Depth of Bottom of Screen: 15'

Depth of Sediment Sump with Plug: 15'

Depth of Bottom of Borehole: 15.3' refusal

MONITORING WELL CONSTRUCTION DIAGRAM
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

APPENDIX E

MONITORING WELL DEVELOPMENT RECORDS

WELL DEVELOPMENT RECORD

Project: 94th Reg. Reed. Comm.	Well Installation Date:		Project No.
Client: kemron	Well Development Date: 1.26.06	Logged by: JKH	Checked by: DLC
Well/Site I.D.: MW-14	Weather: cloudy, v. windy, COLD 20s	Start Date: 1.26.06	Finish Date: 1.26.06
		Start Time: 09H	Finish Time: 1000

Well Construction Record Data:

Well Diameter: 1 in.

Bottom of Screen	12 ft.	From Ground Surface ☑ From Top of Riser ☐
Sediment Sump/Plug	ft.	
Screen Length	10 ft.	Fluids Lost during Drilling: gal.

Protective Casing Stick-up: ft. Protective Casing/Well Diff.: ft.

PID Readings: Ambient Air 0 ppm; Well Mouth 0 ppm

Well Levels:

Initial PVC	3.19 ft.	
End of Development	5.05 ft.	
24 Hours after Development	ft.	
HT of Water Column	ft.	x ☐ 1.68" gal./ft. ☐ _____ = gal./vol. *for 4" HSA Installed Wells

Sediment:

Well Depth before Development	12.20 ft.	(from top of PVC)
Well Depth after Development	13.55 ft.	
Sediment Depth Removed	1.35 ft.	

Equipment:

- ☐ Dedicated Submersible Pump
- ☐ Surge Block
- ☐ Bailer ☐ 2" ☐ _____
- ☐ Grundfos Pump 2" _____ 4" _____
- ✓ GeoTech Pump - peristaltic

Approximate Recharge Rage: gpm

Total Gallons Removed: 7 gal.

Well Development Criteria Met:

Notes: Sediment is v. fine grey silt
Pump rate at 500ml/min
Sheen + odor noted in purge water - contain into 55 gal drum
Well cleanup nicely

End of Well Development Sample (1 pint) Collected? Yes ☐ No ☑

	Yes	No
■ Well water clear to unaided eye	☐	☑
■ Sediment thickness remaining in well is <1.0% of screen length	☑	☐
■ Total water removed = a minimum of 5x calculated well volume plus 5x drilling fluid lost	☑	☐
■ Turbidity < 5NTUs	☐	☑
■ 10% change in field parameters	☑	☐

Water Parameter Measurements

Record at start, twice during and at the end of development (minimum):

Time	Volume	Total Gallons	pH	Temp.	Conductance	Turbidity	Pumping Rate
0920	0.5 GAL	0.5	6.60	9.5 °C	0.453	>1000	0.5 l/m
0930	2 GAL	2.5	6.62	8.4	0.353	>1000	0.5 l/m
0940	1.5	3, 4	6.70	8.3	0.430	178	0.5 l/m
0955	3	7	6.79	8.1	0.421	68.6	"

Well Developer's Signature: Jeffrey K Hanchar

WELL DEVELOPMENT RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC. Inc.

2004005b L 6

Purge vol
HH1

WELL DEVELOPMENT RECORD

Project: 94th RRC Lincoln, RI	Well Installation Date: 5.17.07		Project No. 361804B122
Client: Kemron	Well Development Date: 5.18.07	Logged by: PJM	Checked by:
Well/Site I.D.: MW-14D	Weather: overcast / drizzle	Start Date: 5.18.07	Finish Date: 5.18.07
		Start Time: 1036	Finish Time: 1210

Well Construction Record Data:

Well Diameter: 1 in.

Bottom of Screen	20 ft.	From Ground Surface ☐ From Top of Riser ☒
Sediment Sump/Plug	20 ft.	
Screen Length	10 ft.	

Fluids Lost during Drilling: N/A gal.

Protective Casing Stick-up: N/A ft. Protective Casing/Well Diff.: N/A ft.

PID Readings: Ambient Air 0.0 ppm; Well Mouth 7.6 ppm

Well Levels:

Initial	2.73 ft.
End of Development	6.30 ft.
24 Hours after Development	N/A ft.
HT of Water Column	16.6 ft.

Sediment:

Well Depth before Development	19.3 ft. (from top of PVC)
Well Depth after Development	19.4 ft.
Sediment Depth Removed	0.1 ft.

x ☐ 1.68" gal./ft. ☒ ~~0.041 gal/ft~~ 1.5 = ~~0.68~~ gal./vol. 1" ~~for 4" HSA Installed Wells~~ (PM)

Equipment:

- ☐ Dedicated Submersible Pump
- ☐ Surge Block
- ☐ Bailer ☐ 2" ☐ _____
- ☐ Grundfos Pump 2" ____ 4" ____
- ✓ peristaltic

Approximate Recharge Rage: — gpm

Total Gallons Removed: 9.7 gal.

Well Development Criteria Met:

Notes: 9.7 ppm purge water
slight petroleum odor

	Yes	No
■ Well water clear to unaided eye	☑	☐
■ Sediment thickness remaining in well is <1.0% of screen length	☑	☐
■ Total water removed = a minimum of 5x calculated well volume plus 5x drilling fluid lost	☑	☐
■ Turbidity < 5NTUs	☐	☑
■ 10% change in field parameters	~~☑~~	☑

End of Well Development Sample (1 pint) Collected? Yes ☑ No ☐ VOA VIALS RI22-MWS14D01 (1215)

Water Parameter Measurements

Record at start, twice during and at the end of development (minimum): (°C) (mS/cm)

Time	Volume	Total Gallons	pH	Temp.	Conductance	Turbidity	Pumping Rate
1045	1.0	1.0	6.17	9.25	0.453	>1000	400 mL/min
1110	2.6	3.6	6.19	9.13	0.432	246	"
1135	2.6	6.2	6.24	9.11	0.446	139	"
1208	3.5	9.7	6.16	9.10	0.468	32.9	"

Well Developer's Signature: Philip J. Mueller

WELL DEVELOPMENT RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

WELL DEVELOPMENT RECORD

Project: 94th Reg. Reed. Comm.	Well Installation Date:		Project No.
Client: Kemron	Well Development Date: 1.26.06	Logged by: JKH	Checked by: DLC
Well/Site I.D.: MW-15	Weather: Sun+clouds, windy, cold 20's	Start Date: 1.26.06	Finish Date: 1.26.06
		Start Time: 1028	Finish Time:

Well Construction Record Data:

Well Diameter: 1 in.

Bottom of Screen	12 ft.
Sediment Sump/Plug	ft.
Screen Length	10 ft.

From Ground Surface ☑ From Top of Riser ☐

Fluids Lost during Drilling: gal.

Protective Casing Stick-up: ft. Protective Casing/Well Diff.: ft.

PID Readings: Ambient Air 0 ppm; Well Mouth ppm

Well Levels:

Initial PVC	2.82 ft.	
End of Development	2.88 ft.	
24 Hours after Development	ft.	
HT of Water Column	ft.	x ☐ 1.68" gal./ft. ☐ _____ = gal./vol.

Sediment:

Well Depth before Development	13.00 ft. (from top of PVC)
Well Depth after Development	13.70 ft.
Sediment Depth Removed	0.70 ft.

*for 4" HSA Installed Wells

Equipment:

- ☐ Dedicated Submersible Pump
- ☐ Surge Block
- ☐ Bailer ☐ 2" ☐ _____
- ☐ Grundfos Pump 2" _____ 4" _____
- ✓ Geotech Pump

Approximate Recharge Rage: gpm

Total Gallons Removed: 4 gal.

Well Development Criteria Met:

Notes: Sediments in purge water consists of v. fine brown - light brown silt
Purge rate: 500 ml/min
Sheen + odor in purge water
Well cleared up nicely

End of Well Development Sample (1 pint) Collected? Yes ☐ No ☑

	Yes	No
■ Well water clear to unaided eye	☑	☐
■ Sediment thickness remaining in well is <1.0% of screen length	☑	☐
■ Total water removed = a minimum of 5x calculated well volume plus 5x drilling fluid lost	☑	☐
■ Turbidity < 5NTUs	☐	☑
■ 10% change in field parameters	☑	☐

Water Parameter Measurements

Record at start, twice during and at the end of development (minimum):

Time	Volume	Total Gallons	pH	Temp.	Conductance	Turbidity	Pumping Rate
1030	0.25gals	0.25gals	6.61	9.4	0.066	483	0.5l/m
1039	1.75	2gals	6.23	2.8	0.085	33.0	"
1045	1gal	3gals	6.19	2.6	0.085	23.7	"
1053	1gal	4gals	6.18	2.4	0.085	16.6	"

Well Developer's Signature: Jeff Duchmen

WELL DEVELOPMENT RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC. Inc.

WELL DEVELOPMENT RECORD

Project:	Well Installation Date:		Project No.
94th RRC Lincoln, RI	6.7.07		361804/122.02
Client: Kemron	**Well Development Date:** 6.12.07	**Logged by:** PJM	**Checked by:**
Well/Site I.D.: MW-15D	**Weather:** Cloudy, 70°F	**Start Date:** 6.12.07	**Finish Date:** 6.12.07 6.19.07
Well Construction Record Data:	Well Diameter: 1 in.	**Start Time:** 1002	**Finish Time:** 1132

Bottom of Screen: 15.2 ft.
Sediment Sump/Plug: 15.2 ft.
Screen Length: 5 ft.
From Ground Surface ☒ From Top of Riser ☐
Fluids Lost during Drilling: 2.3 gal.

Protective Casing Stick-up: N/A ft. · Protective Casing/Well Diff.: N/A ft.
PID Readings: Ambient Air 0.0 ppm; Well Mouth 102 ppm

Well Levels: 4.21 6/19/07 **Sediment:** 41.6 6/19/07

Initial	2.80 ft.	Well Depth before Development	13.5 ft.	(from top of PVC)
End of Development	7.20 ft.	11.05 6/19/07 Well Depth after Development	14.7 ft.	
24 Hours after Development	— ft.	Sediment Depth Removed	1.2 ft.	
HT of Water Column	11.9 ft.	☐ 1.68" gal./ft. ~~☒ 0.04~~ (PM) x	7.0	= gal./vol. ~~*for 4" HSA Installed Wells~~ (PM)

Equipment:
- ☐ Dedicated Submersible Pump
- ☐ Surge Block
- ☐ Bailer ☐ 2" ☐ _____
- ☐ Grundfos Pump 2" ____ 4" ____
- ✓ peristaltic pump

Approximate Recharge Rage: — gpm
Total Gallons Removed: 40 gal.

Well Development Criteria Met:

Notes: Petroleum odor + sheen
PID = 94.3 ppm

End of Well Development Sample (1 pint) Collected? Yes ☐ No ☒

	Yes	No
■ Well water clear to unaided eye	☒	☐
■ Sediment thickness remaining in well is <1.0% of screen length	☒	☐
■ Total water removed = a minimum of 5x calculated well volume plus 5x drilling fluid lost	☒	☐
■ Turbidity < 5NTUs	☐	☒
■ 10% change in field parameters	☐	☒

Water Parameter Measurements

Record at start, twice during and at the end of development (minimum): °C; mS/cm; NTU; mL/min

Time	Volume	Total Gallons	pH	Temp.	Conductance	Turbidity	Pumping Rate
1022			6.37	12.62	0.423	120	500
1043			6.20	12.15	0.448	18.6	500
1116			6.29	12.51	0.460	9.03	500
1130			6.35	12.60	0.460	7.20	500
0837 (6/19)			6.14	12.37	0.513	17.3 (PM)	550 600
					0.521	20.2	600
1135 (6/19)			6.14	12.49			

Well Developer's Signature: Philip J. Uffelman

Begin purging @ 0837 on 6/19/07, stop @ 1145

WELL DEVELOPMENT RECORD

Project:	Well Installation Date:		Project No.
94th RRC Lincoln, RI	5.16.07		361804B122
Client:	**Well Development Date:**	**Logged by:**	**Checked by:**
Kemron	5 17 07	TRH	
Well/Site I.D.:	**Weather:**	**Start Date:**	**Finish Date:**
MW-20	Overcast 50°	5.17.07	5.17.07 6.20.07
Well Construction Record Data:	Well Diameter: 1 in.	**Start Time:** 11:25	**Finish Time:** 1202

Bottom of Screen: 12 ft.
Sediment Sump/Plug: ~~12~~ 12 ft. (pm)
Screen Length: 10 ft.
From Ground Surface ☒ From Top of Riser ☒ (pm)
Fluids Lost during Drilling: N/A gal.

Protective Casing Stick-up: N/A ft.
Protective Casing/Well Diff.: flush ft.
PID Readings: Ambient Air 0.0 ppm; Well Mouth 1.6 ppm

Well Levels:

Initial (6.20.07)	~~5.73~~ ~~8.81~~ 4.75 (pm)	ft.
End of Development	5.01	ft.
24 Hours after Development	N/A	ft.

Sediment:

Well Depth before Development	10.90	ft. (from top of PVC)
Well Depth after Development	11.47	ft.
Sediment Depth Removed	0.57	ft.

HT of Water Column: 6.15 ft. x ☐ 1.68" ~~gal./ft.~~ ☑ ~~.04~~ 1.1 (pm) = ~~0.25~~ gal./vol. 1"
~~*for 4" HSA~~ Installed Wells

Equipment:
- ☐ Dedicated Submersible Pump
- ☐ Surge Block
- ☐ Bailer ☐ 2" ☐ _____
- ☐ Grundfos Pump 2" _____ 4" _____
- ✓ peristaltic

Approximate Recharge Rage: — gpm
Total Gallons Removed: ~~3.3~~ 12.3 (pm) gal.

Well Development Criteria Met:

Notes: no odor or sheen in purge water

End of Well Development Sample (1 pint) Collected? Yes ☐ No ☒

	Yes	No
■ Well water clear to unaided eye	☑	☐
■ Sediment thickness remaining in well is <1.0% of screen length	☑	☐
■ Total water removed = a minimum of 5x calculated well volume plus 5x drilling fluid lost	☑	☐
■ Turbidity < 5NTUs	☐	☑
■ 10% change in field parameters	☑ (pm)	☐

Water Parameter Measurements

Record at start, twice during and at the end of development (minimum):

Time	Volume	Total Gallons	pH	Temp.	Conductance	Turbidity	Pumping Rate
1126	1/16	1/16	5.98	9.26	0.296	>1000	300 350
1149	2	~~2 1/16~~ 2 (pm)	5.57	8.86	0.339	45	"
1156	~~.5~~ 0.6	~~2 5/16~~ 2.8 (pm)	5.58	8.83	0.340	17	"
1201	~~.25~~ 0.5	~~2 9/16~~ 3.3 (pm)	5.51	8.81	0.341	10	"
0933 (6.20.07)			5.33	12.7	0.212	372	600
1015			5.37	12.4	0.227	6.54	600

Well Developer's Signature: [signature]

Begin Purging @ 0933 (6.20.07) stop @ 1030

WELL DEVELOPMENT RECORD

Project:	Well Installation Date:		Project No.
94th RRC Lincoln RI	5·17·07		361804.8122
Client: Kemron	**Well Development Date:** 5·18·07	**Logged by:** TRH	**Checked by:**
Well/Site I.D.: MW 20D	**Weather:** Rain, wind 40's	**Start Date:** 5·18·07	**Finish Date:** ~~5·18·07~~ 6.20.07
		Start Time: 1016	**Finish Time:** 1057

Well Construction Record Data:

Well Diameter: 1 in.

Bottom of Screen	20 ft.	From Ground Surface ☒ / From Top of Riser ~~☒~~ (pm)
Sediment Sump/Plug	20 ft.	
Screen Length	10 ft.	Fluids Lost during Drilling: N/A gal.

Protective Casing Stick-up: N/A ft. | Protective Casing/Well Diff.: N/A ft. | PID Readings: (pm)

Ambient Air	~~0.0~~ 0.6 ppm (6.20.07)
Well Mouth	~~0.1~~ 1.6 ppm (6.20.07)

Well Levels: (6.20.07)

Initial	6.28 → 5.16 ft.	
End of Development	8.50 → 5.31 ft.	
24 Hours after Development (6.20.07)	N/A ft.	
HT of Water Column	14.11 ft.	x ☐ 1.68" gal./ft. ~~☒ 0.041~~ gal/ft = ~~0.58~~ 1.3 gal./vol.

Sediment:

Well Depth before Development	19.27 ft.	(from top of PVC)
Well Depth after Development	19.31 ft.	19.40 (6.20.07)
Sediment Depth Removed	0.04 ft.	

~~for 4" HSA Installed Wells~~

Equipment:

- ☐ Dedicated Submersible Pump
- ☐ Surge Block
- ☐ Bailer ☐ 2" ☐ _____
- ☐ Grundfos Pump 2" _____ 4" _____
- ✓ peristaltic

Approximate Recharge Rage: — gpm

Total Gallons Removed: ~~3.32~~ 3.1 gal. (pm)

(pm) 7.2

Well Development Criteria Met:

Notes: purge water PID = 1.2 ppm

End of Well Development Sample (1 pint) Collected? Yes ☐ No ☒

	Yes	No
■ Well water clear to unaided eye	☑	☐
■ Sediment thickness remaining in well is <1.0% of screen length	☑	☐
■ Total water removed = a minimum of 5x calculated well volume plus 5x drilling fluid lost	☑	☐
■ Turbidity < 5NTUs	~~☒~~ ☑ (pm)	☐ ~~☒~~ (TM)
■ 10% change in field parameters	☑	☐

Water Parameter Measurements

Record at start, twice during and at the end of development (minimum):

Time	Volume	Total Gallons	pH	Temp.	Conductance	Turbidity	Pumping Rate
1031	1.2	1.2	6.03	8.61	0.241	194	300
1040	0.7	1.9	5.91	8.88	0.279	118	
1050	0.8	2.7	5.89	8.92	0.270	45.2	
1055	0.4	3.1	5.89	8.88	0.271	35.5	V
0941 (6.20.07)			5.89	11.02	0.293	38.9	700
0954 (6.20.07)			5.68 (6.20.07)	10.80	0.314	3.97	700

Well Developer's Signature: [signature]

Begin purging @ 0935 & stop @ 1005

WELL DEVELOPMENT RECORD

Project:	Well Installation Date:		Project No.
94Th RRC, Lincoln, RI	5/16/07		36180401.22
Client: Kenaton (GH)	**Well Development Date:** 5/17/07	**Logged by:** TRH	**Checked by:**
Well/Site I.D.: MW-22 21	**Weather:** Overcast 50°	**Start Date:** 5/16/07 (PW)	**Finish Date:** 5/17/07 (PW)
		Start Time: 1415 1400 (PW)	**Finish Time:** 1505

Well Construction Record Data:

Bottom of Screen	12 ft.	Well Diameter	1 in.
Sediment Sump/Plug	13 ft.	From Ground Surface ❑	From Top of Riser ☒
Screen Length	10 ft.	Fluids Lost during Drilling	N/A gal.

Protective Casing Stick-up	N/A ft.	Protective Casing/Well Diff.	flush ft.	PID Readings: Ambient Air	0.0 ppm
				Well Mouth	1.7 ppm

Well Levels:

Initial	3.22 ft.	4.46 (6.20.07)
End of Development	3.37 ft.	5.90 (6.20.07)
24 Hours after Development	N/A ft.	
HT of Water Column	7.72 ft.	8.13 (PW)

Sediment:

Well Depth before Development	10.44 ~~11.13~~ (TH) ft.	(from top of PVC) 1.1 (6.20.07)
Well Depth after Development	11.35 ft.	11.40 (6.20.07)
Sediment Depth Removed	0.41 ft.	0.46 (6.20.07)
x ❑ 1.68" gal./ft. ❑ ~~0.041~~	= ~~0.32~~ 1.3 (PW)	gal./vol. *~~for 4" HSA Installed Wells~~

Equipment:

- ❑ Dedicated Submersible Pump
- ❑ Surge Block
- ❑ Bailer ❑ 2" ❑ _____
- ❑ Grundfos Pump 2" _____ 4" _____
- ✓ peristaltic

Approximate Recharge Rage: — gpm

Total Gallons Removed: ~~5.5~~ 9.5 gal. (PW)

Well Development Criteria Met:

Notes: no sheen or odor

PID = 1.5 ppm in purge water

End of Well Development Sample (1 pint) Collected? Yes ❑ No ☑

	Yes	No
■ Well water clear to unaided eye	☑	❑
■ Sediment thickness remaining in well is <1.0% of screen length	☑	❑
■ Total water removed = a minimum of 5x calculated well volume plus 5x drilling fluid lost	☑	❑
■ Turbidity < 5NTUs	☒	☑ (PW)
■ 10% change in field parameters	❑	☑

Water Parameter Measurements

Record at start, twice during and at the end of development (minimum):

Time	Volume	Total Gallons	pH	Temp. °C	Conductance (mS/cm)	Turbidity NTU	Pumping Rate (mL/m)
~~1415~~	1.3	1.3	5.88	10.12	0.239	>1000	320 ml/min
1430	1.3	2.6	5.70	9.57	0.245	260	
1445	1.3	3.9	5.67	9.35	0.232	36	
1500	1.3	~~5.2~~ (PW) 7.8	5.70	9.62	0.236	31	
0900 (6.20.07)			5.94	11.96	0.271	7.01	700
			5.99	12.00	0.266 (PW)	~~7.01~~ 2.77	700

Well Developer's Signature: [signature]

0910 (6.20.07)

Begin purging @ 0840 (6.20.07) stop @ 0911 (6.20.07)

WELL DEVELOPMENT RECORD

Project: 94th RRC, Lincoln, RI	Well Installation Date: 6.7.07		Project No. 361804.8122.02
Client: Kemron	Well Development Date: 6.12.07	Logged by: PJM	Checked by:
Well/Site I.D.: MW-21D	Weather: cloudy, 70°F	Start Date: 6.12.07	Finish Date: 6.20.07
		Start Time: 1215	Finish Time: 1350

Well Construction Record Data:

Well Diameter: 1 in.

Bottom of Screen	17.5 ft. (ppm)	From Ground Surface ☒ From Top of Riser ☐
Sediment Sump/Plug	17.5 ft. (ppm)	
Screen Length	5 ft.	Fluids Lost during Drilling: 2.6 gal.

Protective Casing Stick-up: N/A ft. · Protective Casing/Well Diff.: N/A ft. PID Readings: Ambient Air 0.0 ppm; Well Mouth 4.9 ppm

Well Levels: 4.76 (6.19.07)

Initial	2.73 ft.	Well Depth before Development	16.0 ft. (from top of PVC)
End of Development	11.45 ft.	Well Depth after Development	16.6 ft. 16.7 (6.20.07)
24 Hours after Development	— ft.	Sediment Depth Removed	0.6 ft. 0.7 (6.20.07)
HT of Water Column	13.87 ft.	x ☐ ~~1.68~~ gal./ft. ☐ ____ =	8.1 gal./vol. ~~*for 4" HSA Installed Wells~~

Sediment: 3.5 6.19.07

12.95 (6.20.07)

Equipment:

- ☐ Dedicated Submersible Pump
- ☐ Surge Block
- ☐ Bailer ☐ 2" ☐ ____
- ☐ Grundfos Pump 2" ____ 4" ____
- ☒ peristaltic

Approximate Recharge Rage (ppm): ~~44.5~~ gpm

Total Gallons Removed: 44.5 gal. in purge bucket (ppm)

Well Development Criteria Met:

Notes: slight petroleum odor (may be from previous well) PID = 8.7 ppm
PID = 5.2 ppm after 30 min. purging. PID = 3.3 ppm (6.19.07)

End of Well Development Sample (1 pint) Collected? Yes ☐ No ☒

	Yes	No
■ Well water clear to unaided eye	☒	☐
■ Sediment thickness remaining in well is <1.0% of screen length	☒	☐
■ Total water removed = a minimum of 5x calculated well volume plus 5x drilling fluid lost	☒	☐
■ Turbidity < 5NTUs	☐	☒
■ 10% change in field parameters	☐	☒

Water Parameter Measurements

Record at start, twice during and at the end of development (minimum):

Time	Volume	Total Gallons	pH	Temp. °C	Conductance mS/cm	Turbidity NTU	Pumping Rate mL/min
1242			6.45	11.90	0.362	790	500
1300			6.40	11.49	0.368	56.1	500
1326			6.40	11.80	0.376	17.0	500
1347			6.40	11.72	0.390	15.8	500
1208 (6.19)			6.56	14.98	0.414	184	(ppm) ~~500~~ 400
0850 (6.20)			6.52	11.02	0.471	16.2	500

Well Developer's Signature: Peter J. Mullen

Begin purging @ 1204 (6.19.07), stop @ 1625
Begin purging @ 0700 (6.20.07) stop @ 0920 (6.20.07)

WELL DEVELOPMENT RECORD

Project:	Well Installation Date:		Project No.
Kenron, Lincoln, RI	5.16.07		36/B048122
Client:	**Well Development Date:**	**Logged by:**	**Checked by:**
Kenron	5.18.07	TRH/PJM	
Well/Site I.D.:	**Weather:**	**Start Date:**	**Finish Date:**
MW-22	Rain, 40's	5.18.07	~~5.18.07~~ 6.20.07

Well Construction Record Data:

Bottom of Screen	12 ft.	Well Diameter	1 in.
Sediment Sump/Plug	12 ft.	Start Time:	0847
Screen Length	10 ft.	Finish Time:	0950

From Ground Surface ☒ From Top of Riser ☑ (pm)

Fluids Lost during Drilling: — gal.

Protective Casing Stick-up	N/A ft.	Protective Casing/Well Diff.	— ft.	PID Readings: Ambient Air	0.0 ppm
				Well Mouth	0.3 ppm

Well Levels: 3.40 (6.20.07)

Initial	2.10 ft.	Well Depth before Development	11.29 ft.	(from top of PVC)	
End of Development	2.12 ft.	Well Depth after Development	11.70 ft.	11.75 (6.20.07)	
24 Hours after Development	N/A ft.	Sediment Depth Removed	0.41 ft.	0.46	
HT of Water Column	9.19 ft.	x ☐ 1.68" gal./ft. ☑ ~~0.040~~ gal/ft. =	1.5 ~~0.38~~	gal./vol. ~~2"~~ 1" *for ~~4"~~ HSA Installed Wells	

Sediment: 0.8 (6.20.07)

3.90 (6.20.07)

(pm)

Equipment:

- ☐ Dedicated Submersible Pump
- ☐ Surge Block
- ☐ Bailer ☐ 2" ☐ _____
- ☐ Grundfos Pump 2" _____ 4" _____
- ✓ peristaltic

Approximate Recharge Rage: — gpm

Total Gallons Removed: ~~6.3~~ 11.3 gal. (pm)

Well Development Criteria Met:

Notes: no sheen or odor in purge water
PID = 0.9 ppm

End of Well Development Sample (1 pint) Collected? Yes ☐ No ☑

	Yes	No
■ Well water clear to unaided eye	☑	☐
■ Sediment thickness remaining in well is <1.0% of screen length	☑	☐
■ Total water removed = a minimum of 5x calculated well volume plus 5x drilling fluid lost	☑	☐
■ Turbidity < 5NTUs	☐	☑
■ 10% change in field parameters	☐	☑

Water Parameter Measurements

Record at start, twice during and at the end of development (minimum): (°C) (mS/cm)

Time	Volume	Total Gallons	pH	Temp.	Conductance	Turbidity	Pumping Rate
0854	0.7	0.7	5.88	9.33	0.310	>1000	400 mL/min
0909 (pm)	~~2.3~~ 1.6	2.3	5.94	9.34	0.302	331	450
0940	3.3	5.6	5.87	9.24	0.300	152	400
0947	0.7	6.3	5.87	9.23	0.300	45.0	400
0758 (6.20.07)			5.92	12.53	0.305	263	550
0810 (6.20.07)			5.97	12.39	0.293	11.9	550

Well Developer's Signature: Philip J. Mc

Begin purging @ 0745 (6.20.07). Stop @ 0820

WELL DEVELOPMENT RECORD

Project: 94th RRC Lincoln, RI	Well Installation Date: 6.8.07		Project No. 3618048123.02
Client: Kemron	Well Development Date: 6.13.07	Logged by: PJM	Checked by:
Well/Site I.D.: MW-22D	Weather: Cloudy	Start Date: 6.13.07	Finish Date: 6.19.07
		Start Time: 1323	Finish Time: 1606

Well Construction Record Data: Well Diameter: 1 in.

Bottom of Screen	17 ft.	From Ground Surface ☒ From Top of Riser ☐
Sediment Sump/Plug	17 ft.	
Screen Length	5 ft.	Fluids Lost during Drilling: 2.5 gal.

Protective Casing Stick-up: N/A ft. · Protective Casing/Well Diff.: N/A ft. PID Readings: Ambient Air 0.1 ppm; Well Mouth 0.8 ppm

Well Levels: (6.19.07)

Initial 3.36	2.53 ft.	Well Depth before Development	14.6 ft. (from top of PVC)
End of Development	4.05 ft. (6.19.07)	Well Depth after Development	16.6 ft.
24 Hours after Development	— ft.	Sediment Depth Removed	2.0 ft.
HT of Water Column	14.47 ft.	x ☐ 1.68" ~~gal./ft.~~ ☐ ____ =	8.5 gal./vol. ~~*for 4" HSA Installed Wells~~

Equipment:

- ☐ Dedicated Submersible Pump
- ☐ Surge Block
- ☐ Bailer ☐ 2" ☐ ____
- ☐ Grundfos Pump 2" ____ 4" ____

✓ peristaltic + check valve (see notes)

Approximate Recharge Rage: — gpm

Total Gallons Removed: 46 gal.

Well Development Criteria Met:

Notes: PID = 0.5 ppm purge water

	Yes	No
■ Well water clear to unaided eye	☒	☐
■ Sediment thickness remaining in well is <1.0% of screen length	☒	☐
■ Total water removed = a minimum of 5x calculated well volume plus 5x drilling fluid lost	☒	☐
■ Turbidity < 5NTUs	☒	☐
■ 10% change in field parameters	☐	☒

End of Well Development Sample (1 pint) Collected? Yes ☐ No ☒

Water Parameter Measurements

Record at start, twice during and at the end of development (minimum):

Time	Volume	Total Gallons	pH	Temp. (°C)	Conductance (mS/cm)	Turbidity (NTU)	Pumping Rate (mL/min)
1338			5.89	11.47	0.204	>1000	500
1340 (6.19)			5.76	11.77	0.232	407	700
1449 (6.19)			6.41	11.87	0.221	11.0	700
1600 (6.19)			6.38	11.63	0.216	4.49	700

Well Developer's Signature: Peter E. Allen

Note: 12 gallons removed w/ 5/8" OD tubing and waterra check valve – sig. sand removed.

Begin Purging 1326 (6.19.07), stop @ 1606 (6.19.07)

WELL DEVELOPMENT RECORD

Project: 94th RRC Lincoln, RI	Well Installation Date: 6.8.07		Project No. 361804812Z-02
Client: Kemron	Well Development Date: 6.12.07	Logged by: PJM	Checked by:
Well/Site I.D.: MW-24D	Weather: Mostly cloudy, 70°F	Start Date: 6-12-07	Finish Date: 6.12.07 6.19.07
Well Construction Record Data:	Well Diameter: 1 in.	Start Time: 1403	Finish Time: 1520

Bottom of Screen: 15.0 ft.
Sediment Sump/Plug: 15.0 ft.
Screen Length: 5 ft.
From Ground Surface ☒ From Top of Riser ☐
Fluids Lost during Drilling: — gal.

Protective Casing Stick-up: N/A ft. · Protective Casing/Well Diff.: N/A ft.

PID Readings: Ambient Air 0.0 ppm; Well Mouth 6.0 ppm

Well Levels:

Initial	3.90 ft. (6.19.07) 5.09	Sediment: Well Depth before Development	13.6 ft. (from top of PVC) (pw) 0.0 (6.19.07)
End of Development	14.3 ft. (dry)	Well Depth after Development	14.3 ft. (pw)
24 Hours after Development	— ft.	Sediment Depth Removed	0.7 ft.
HT of Water Column	10.4 ft.	☐ 1.68" gal./ft. ~~☒ 0.041~~ 0.9	0.42 (pw) gal./vol. ~~*for 4" HSA Installed Wells~~

Equipment:

- ☐ Dedicated Submersible Pump
- ☐ Surge Block
- ☐ Bailer ☐ 2" ☐ _____
- ☐ Grundfos Pump 2" _____ 4" _____
- ✓ peristaltic

Approximate Recharge Rage: . gpm
Total Gallons Removed: 3.0 gal.

Well Development Criteria Met:

Notes: @ 1420 well is dry (pumping rate was 500ml/min). Wait 20min. Begin pumping @ 300 ml/min until dry... Purge water PID = 2.3 ppm.

End of Well Development Sample (1 pint) Collected? Yes ☐ No ☒

	Yes	No
■ Well water clear to unaided eye	☒	☐
■ Sediment thickness remaining in well is <1.0% of screen length	☒	☐
■ Total water removed = a minimum of 5x calculated well volume plus 5x drilling fluid lost	☒	☐
■ Turbidity < 5NTUs	☐	☒
■ 10% change in field parameters	☐	☒

Water Parameter Measurements

Record at start, twice during and at the end of development (minimum):

Time	Volume	Total Gallons	pH	Temp. °C	Conductance ms/cm	Turbidity NTU	Pumping Rate ml/min
1444			6.66	12.87	0.496	52.1	300
1454			6.65	13.63	0.499	35.8	300
1504			6.52	12.98	0.491	26.8	300
1514			6.71	13.45	0.490	~~25.7~~	300
1610			6.56	16.00	0.476 (pw)	17.0 777	450

Well Developer's Signature: _____

Begin purging @ 1550 (6.19.07) dry after 4 mins.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

JOB NUMBER:

PROJECT: Lincoln, RI 94th RRC | FIELD SAMPLE NUMBER: | EVENT NO.:

SITE ID: MW-1 | SITE TYPE: | DATE: 1.27.06

ACTIVITY: START 1030 END 1220 | SAMPLE TIME: ~~1200~~ | FILE TYPE:

WATER LEVEL / PUMP SETTINGS

INITIAL DEPTH TO WATER	3.47 FT	MEASUREMENT POINT: [X] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING	PROTECTIVE CASING STICKUP (FROM GROUND)	FT	CASING / WELL DIFFERENCE FT
FINAL DEPTH TO WATER	4.28 FT	HISTORICAL WELL DEPTH (TOR) 21.2 (meas.) FT	PID AMBIENT AIR	0 PPM	WELL DIAMETER 2 IN
SCREEN LENGTH	10' (assumed) FT	PRESSURE TO PUMP PSI	PID WELL MOUTH	0 PPM	WELL INTERGRITY:
TOTAL VOL. PURGED	2.39 GAL	REFILL SETTING	DISCHARGE SETTING		

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY:	YES	NO	N/A
CAP	X		
CASING	X		
LOCKED	X		
COLLAR	X		

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (+/- deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	DO (mg/L)	TURBIDITY (ntu)	REDOX (+/- mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
1056	3.41	120 pm	Begin	Purging					12	clear
1101	3.88	~~120~~ 150							12	"
1107	4.12	150					40.4		12	"
1110	Hooking	to	Horiba						12	"
1114	4.20	130	8.9	0.072	6.55	—	34.5	130	12	"
1119	4.22	130	6.1	0.077	6.46	—	29.9	151	12	"
1128	4.28	130	5.0	0.080	6.43	—	24.9	167	12	"
1134	4.28	130	5.1	0.078	6.40	—	21.3	174	12	"
1144	4.28	130	~~43.9~~ pm	0.079	6.44	—	21.0	179	12	"
1148	4.28	130	4.7	0.079	6.42	—	20.9	181	12	"
1152	4.28	130	4.7	0.078	6.40	—	16.2	183	12	"
1156	4.28	130	4.7	0.079	6.40	—	17.2	184	12	"

continues on next page

EQUIPMENT DOCUMENTATION

TYPE OF PUMP (for purging only): [ ] BLADDER [X] PERISTALTIC [ ] OTHER

TYPE OF TUBING: [ ] HIGH DENSITY POLYETHYLENE [X] OTHER LDPE

TYPE OF PUMP MATERIAL: [ ] STAINLESS STEEL [ ] OTHER

TYPE OF BLADDER MATERIAL: [ ] TEFLON [ ] OTHER

ANALYTICAL PARAMETERS

ANALYSIS	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS

See page 2/2

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES (NO)

* no sheen or odor from initial 2' bailer

NOTES:

SIGNATURE: [signature]

CHECKED BY: PJM

LOW FLOW GROUNDWATER DATA RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004

MACTEC, Inc.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

JOB NUMBER

PROJECT: Lincoln, RI 94th RRC | FIELD SAMPLE NUMBER: RI22-GWSMW101 | EVENT NO.

SITE ID: MW-1 | SITE TYPE | DATE: 1/27/06

ACTIVITY: START ~~1200~~ END ~~1205~~ | SAMPLE TIME: 1205 | FILE TYPE

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: ☐ TOP OF WELL RISER ☐ TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER (FT)		PROTECTIVE CASING STICKUP (FROM GROUND) (FT)		CASING / WELL DIFFERENCE (FT)	
FINAL DEPTH TO WATER (FT)		HISTORICAL WELL DEPTH (TOR) (FT)		PID AMBIENT AIR (PPM)	
SCREEN LENGTH (FT)		PRESSURE TO PUMP (PSI)		PID WELL MOUTH (PPM)	
TOTAL VOL. PURGED (GAL)		REFILL SETTING		DISCHARGE SETTING	

WELL DIAMETER (IN)

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY:

INTEGRITY:	YES	NO	N/A
CAP	—	—	—
CASING	—	—	—
LOCKED	—	—	—
COLLAR	—	—	—

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (+/- deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	DO (mg/L)	TURBIDITY (ntu)	REDOX (+/- mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
1200	4.26	130	4.7	0.079	6.39	—	16.1	185	12	clear
1205	collect	sample	RI22-GWSMW101			by bailer – diss. lead			by peristaltic pump	

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	TYPE OF TUBING	TYPE OF PUMP MATERIAL	TYPE OF BLADDER MATERIAL
☐ BLADDER	☐ HIGH DENSITY POLYETHYLENE	☐ STAINLESS STEEL	☐ TEFLON
☐ PERISTALTIC ☐ OTHER _____	☐ OTHER _____	☐ OTHER _____	☐ OTHER _____

ANALYTICAL PARAMETERS

ANALYSIS	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
VOC	8260	HCl + 4°C	40mL	Y	RI22-GWSMW101
Total Lead	6010	HNO_3	250mL	Y	"
Dissolved Lead		HNO_3	250mL	Y	"

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED YES NO N/A

NOTES:

SIGNATURE: _____

PRINT: Dawn Chapin

LOW FLOW GROUNDWATER DATA RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004

MACTEC, Inc.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

JOB NUMBER

PROJECT: 94th RRC Lincoln, RI | FIELD SAMPLE NUMBER: RI22-GWSMW801 | EVENT NO.

SITE ID: MW-8 | SITE TYPE | DATE: 1-30-06

ACTIVITY START: 0824 END: 8:40 | SAMPLE TIME: 0840 | FILE TYPE

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: [X] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	3.45 FT	PROTECTIVE CASING STICKUP (FROM GROUND)	1.8 FT	CASING / WELL DIFFERENCE	FT
FINAL DEPTH TO WATER	5.30 FT	HISTORICAL WELL DEPTH (TOR)	17.8 FT	PID AMBIENT AIR	0 PPM
SCREEN LENGTH	10 ~~(assumed)~~ FT	PRESSURE TO PUMP	PSI	PID WELL MOUTH	0 PPM
TOTAL VOL. PURGED	see purge rpt. 1.27.06 GAL	REFILL SETTING		DISCHARGE SETTING	

WELL DIAMETER: 2 IN

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY:

INTEGRITY:	YES	NO	N/A
CAP	X		
CASING	X		
LOCKED	X		
COLLAR			

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (+/- deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	DO (mg/L)	TURBIDITY (ntu)	REDOX (+/- mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
0838	3.45	—	8.9	0.281	6.09	—	16.3	29	13	bailer
0840	collect	sample	RI22-GWSMW801							

EQUIPMENT DOCUMENTATION

TYPE OF PUMP: [ ] BLADDER [ ] PERISTALTIC [X] OTHER bailer

TYPE OF TUBING: [ ] HIGH DENSITY POLYETHYLENE [ ] OTHER

TYPE OF PUMP MATERIAL: [ ] STAINLESS STEEL [ ] OTHER

TYPE OF BLADDER MATERIAL: [ ] TEFLON [ ] OTHER

ANALYTICAL PARAMETERS

ANALYSIS	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
VOC	8260	HCl + 4°C	40mL	Y	RI22-GWSMW801
Total Lead	6010	HNO_3	250mL	Y	"
Dissolved Lead		HNO_3	250mL	Y	"

PURGE OBSERVATIONS: No sheen or odor, water has orange color

PURGE WATER CONTAINERIZED (YES) NO: see 1/27 for purge report

NOTES:

SIGNATURE:

CHECKED BY:

LOW FLOW GROUNDWATER DATA RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004

MACTEC, Inc.

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FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

JOB NUMBER

PROJECT: 94TH RRC. Lincoln, RI | FIELD SAMPLE NUMBER | EVENT NO.

SITE ID: MW-5 Site 04 | SITE TYPE | DATE: 4.27.06

ACTIVITY: START 0735 END 0830 | SAMPLE TIME: N.A. | FILE TYPE

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: ☐ TOP OF WELL RISER ☐ TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	3.66 FT	HISTORICAL WELL DEPTH (TOR)	17.8 FT (1.8+16.0=17.8)	PROTECTIVE CASING STICKUP (FROM GROUND)	1.8 FT
FINAL DEPTH TO WATER	dry FT	PID AMBIENT AIR	0 PPM	CASING / WELL DIFFERENCE	FT
SCREEN LENGTH	10 FT	PRESSURE TO PUMP	PSI	PID WELL MOUTH	0 PPM
TOTAL VOL. PURGED	2.16 GAL	REFILL SETTING		DISCHARGE SETTING	
				WELL DIAMETER	2 IN

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY:

INTEGRITY:	YES	NO	N/A
CAP	X		
CASING	X		
LOCKED	X		
COLLAR	upset		

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (+/- deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	DO (mg/L)	TURBIDITY (ntu)	REDOX (+/- mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
0752	4.62	180	Begin	Purging			382		13	reduced by
0755	Hookup to Horiba								13	"
0759	7.33	180	7.4	0.249	6.15	—	342	31 mV	13	"
0805	8.20	150	5.8	0.313	6.34	—	316	12	13	"
0809	Pump increased to purge well dry due to slow recovery 17									"
0823	well is dry	@ 17.6'								

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	TYPE OF TUBING	TYPE OF PUMP MATERIAL	TYPE OF BLADDER MATERIAL
☐ BLADDER	☒ ~~HIGH~~ LOW DENSITY POLYETHYLENE	☐ STAINLESS STEEL	☐ TEFLON
☒ PERISTALTIC ☐ OTHER _____	☐ OTHER _____	☐ OTHER _____	☐ OTHER _____

ANALYTICAL PARAMETERS

ANALYSIS	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
none					

Volume purged = (17.6' - 4.62') x 0.163 gal/ft = 2.16 gal

PURGE OBSERVATIONS

before purging water obtained top 2' — no product but pet. odor

PURGE WATER CONTAINERIZED (YES) NO

NOTES:

SIGNATURE: Philip J. Affleck

CHECKED BY: David Rayer

LOW FLOW GROUNDWATER DATA RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004

MACTEC, Inc.

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FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

JOB NUMBER

PROJECT: 94th RRC Lincoln, RI | FIELD SAMPLE NUMBER | EVENT NO.

SITE ID: MW-14 | SITE TYPE | DATE: 1-30-06

ACTIVITY START: 0916 END: 1110 | SAMPLE TIME: 1045 | FILE TYPE

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: [ ] TOP OF WELL RISER [X] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	3.28 FT	HISTORICAL WELL DEPTH (TOR)	14.1 FT (12' + 2.1' = 14.1)	PROTECTIVE CASING STICKUP (FROM GROUND)	2.1 FT
FINAL DEPTH TO WATER	3.61 FT	PID AMBIENT AIR	0 PPM	CASING / WELL DIFFERENCE	FT
SCREEN LENGTH	10' FT	PRESSURE TO PUMP	PSI	PID WELL MOUTH	0 PPM
TOTAL VOL. PURGED	~~1.65~~ 2.38 GAL	REFILL SETTING		DISCHARGE SETTING	
				WELL DIAMETER	1 IN

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY:

INTEGRITY:	YES	NO	N/A
CAP	X		
CASING	X		
LOCKED			
COLLAR	X		

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (+/- deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	DO (mg/L)	TURBIDITY (ntu)	REDOX (+/- mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
0938		100								Begin purging
0941	3.45						14.4			clear
0942	stacker to		Horiba							
0945	3.52	120	8.1	0.483	6.52	—	91.9	-68	9	cloudy
0950	3.54	120	7.6	0.474	6.53	—	62.7	-82	9	"
0955	3.54	~~120~~ 160	8.9	0.443	6.50	—	51.8	-91	9	clearing
1000	3.54	160	7.5	0.450	6.49	—	15.2	-93	9	clear
1005	3.54	150	7.4	0.436	6.49	—	1.82	-95	9	clear
1010	3.56	140	7.2	0.430	6.48	—	2.41	-96	9	clear
1015	3.60	140	~~8.5~~ 7.5	0.405	6.49	—	2.31	-98	9	clear
1020	3.60	140	7.6	0.408	6.49	—	13.2	-99	9	clear
1025	3.60	140	8.1	0.392	6.50	—	12.0	-100	9	clear

EQUIPMENT DOCUMENTATION

TYPE OF PUMP: [ ] BLADDER [X] PERISTALTIC (purging only) [ ] OTHER

TYPE OF TUBING: [X] Low ~~HIGH~~ DENSITY POLYETHYLENE [ ] OTHER

TYPE OF PUMP MATERIAL: [ ] STAINLESS STEEL [ ] OTHER

TYPE OF BLADDER MATERIAL: [ ] TEFLON [ ] OTHER

ANALYTICAL PARAMETERS

ANALYSIS	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
VOC	8260B	HCl and 4°C	vial	Y	RI22-GWSMW1401
Total Lead	6010B	HNO_3	250 mL	Y	"
Dissolved Lead		HNO_3	250 mL	Y	"

PURGE OBSERVATIONS

bailer obtained 2' sample before purging - no product, however, petroleum odor present

PURGE WATER CONTAINERIZED (YES) NO

NOTES: * Sheen visible in purge bucket

SIGNATURE: [signature]

CHECKED BY: David Chapman

LOW FLOW GROUNDWATER DATA RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

JOB NUMBER:

PROJECT: 94th RRC Lincoln, RI | FIELD SAMPLE NUMBER: RI22-GWSMW1401 | EVENT NO.:

SITE ID: MW-14 (continued) | SITE TYPE: | DATE: 1/30/06

ACTIVITY: START ~~10:30~~ END | SAMPLE TIME: 10:45 | FILE TYPE:

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: ☐ TOP OF WELL RISER ☐ TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	FT	HISTORICAL WELL DEPTH (TOR)	FT	PROTECTIVE CASING STICKUP (FROM GROUND)	FT
FINAL DEPTH TO WATER	FT	PID AMBIENT AIR	PPM	CASING / WELL DIFFERENCE	FT
SCREEN LENGTH	FT	PRESSURE TO PUMP	PSI	PID WELL MOUTH	PPM
TOTAL VOL. PURGED	GAL	REFILL SETTING		DISCHARGE SETTING	
				WELL DIAMETER	IN

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY:

INTEGRITY:	YES	NO	N/A
CAP			
CASING			
LOCKED			
COLLAR			

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (+/- deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	DO (mg/L)	TURBIDITY (ntu)	REDOX (+/- mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
1030	3.60	140	8.3	0.387	6.50	9.72	8.37	-101	9	
1035	3.61	140	8.7	0.379	6.51	9.34	8.07	-102	9	
1040	3.61	140	9.0	0.378	6.52	9.02	8.00	-102	9	
1045	collect	Sample	RI22-GWSMW1401							

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	TYPE OF TUBING	TYPE OF PUMP MATERIAL	TYPE OF BLADDER MATERIAL
☐ BLADDER	☐ HIGH DENSITY POLYETHYLENE	☐ STAINLESS STEEL	☐ TEFLON
☐ PERISTALTIC ☐ OTHER _____	☐ OTHER _____	☐ OTHER _____	☐ OTHER _____

ANALYTICAL PARAMETERS

ANALYSIS	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS

See page 1/2

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED (YES) NO

NOTES:

SIGNATURE: _____

CHECKED BY: _____

LOW FLOW GROUNDWATER DATA RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004

MACTEC, Inc.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

JOB NUMBER:

PROJECT: 94 RRC, Lincoln, RI | FIELD SAMPLE NUMBER: RI22 - GWSMW201 | EVENT NO.:

SITE ID: MW-2 | SITE TYPE: | DATE: 1/30/04

ACTIVITY: START 8:35 END 9:19 | SAMPLE TIME: 9:19 | FILE TYPE:

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: [X] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	3.38 FT	PROTECTIVE CASING STICKUP (FROM GROUND)	FT	CASING / WELL DIFFERENCE	FT
FINAL DEPTH TO WATER	6.93 FT	HISTORICAL WELL DEPTH (TOR)	21 FT	WELL DIAMETER	2 IN
SCREEN LENGTH	FT	PRESSURE TO PUMP	N/A PSI	PID AMBIENT AIR	N/A PPM
TOTAL VOL. PURGED	3.5 liters	REFILL SETTING	N/A	PID WELL MOUTH	N/A PPM
		DISCHARGE SETTING			

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY:

INTEGRITY:	YES	NO	N/A
CAP	X		
CASING	X		
LOCKED			
COLLAR	X		

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (+/- deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	DO (mg/L)	TURBIDITY (ntu)	REDOX (+/- mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
8:39	5.44	125	8.4	0.255	6.06	6.24	21.1	236	16'	
8:47	6.09	100	7.8	0.234	6.49	Error	27.2	227		
8:57	6.46	100	7.8	0.228	6.50		26.2	219		
9:03	6.65	100	8.1	0.227	6.51		21.8	209		
9:08	6.88	115	7.7	0.228	6.54		24.7			
9:14	6.93	115	8.2	0.225	6.55					
9:19	Sample									

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	TYPE OF TUBING	TYPE OF PUMP MATERIAL	TYPE OF BLADDER MATERIAL
[ ] BLADDER	[ ] HIGH DENSITY POLYETHYLENE	[ ] STAINLESS STEEL	[ ] TEFLON
[X] PERISTALTIC [ ] OTHER	[ ] OTHER	[ ] OTHER	[ ] OTHER

ANALYTICAL PARAMETERS

ANALYSIS	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
VOCs		HCl	4 x 40ML	X	
Total Pb		~~HNO3~~	1 x 250 ML	X	
Diss metals		HNO_3	1 x 250ML	X	

Comments: Water was bailed. No sheen or odor
new DTW was taken: 4.33

1 well volume = 0.~~8~~ 2.89 gals

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED (YES) NO

NOTES:

SIGNATURE: David Chaplin

CHECKED BY: David Chaplin

LOW FLOW GROUNDWATER DATA RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004

MACTEC, Inc.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

JOB NUMBER

PROJECT: 94 RRC Lincoln, NE | FIELD SAMPLE NUMBER: RI22-GWS MW1501 | EVENT NO.

SITE ID: MW-15 | SITE TYPE | DATE: 1/30/06

ACTIVITY: START 10:20 END 11:11 | SAMPLE TIME: 11:11 | FILE TYPE

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: [X] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	2.71 FT	HISTORICAL WELL DEPTH (TOR)	14.3 FT	PROTECTIVE CASING STICKUP (FROM GROUND)	FT
FINAL DEPTH TO WATER	2.77 FT	PID AMBIENT AIR	N/A PPM	CASING / WELL DIFFERENCE	FT
SCREEN LENGTH	FT	PRESSURE TO PUMP	N/A PSI	PID WELL MOUTH	N/A PPM
TOTAL VOL. PURGED	4 liters	REFILL SETTING	N/A	WELL DIAMETER	1 IN
		DISCHARGE SETTING	N/A		

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY:

INTEGRITY:	YES	NO	N/A
CAP	X		
CASING	X		
LOCKED			
COLLAR	X		

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (+/- deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	DO (mg/L)	TURBIDITY (ntu)	REDOX (+/- mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
10:31	2.71	125	3.5	0.124	6.53	1.03	121	128	12	
10:41	2.71	125	2.9	0.123	6.41	1.36	57.0	128	12	
10:51	2.76	125	2.8	0.122	6.41	0.18	20.7	152		
11:01	2.77	125	2.9	0.121	6.42	0.43	6.68	157		
11:06	2.77	125	2.9	0.120	6.43	0.42	4.68	153		
11:11	Sample									

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	TYPE OF TUBING	TYPE OF PUMP MATERIAL	TYPE OF BLADDER MATERIAL
[ ] BLADDER	[ ] HIGH DENSITY POLYETHYLENE	[ ] STAINLESS STEEL	[ ] TEFLON
[X] PERISTALTIC [ ] OTHER	[ ] OTHER	[ ] OTHER	[ ] OTHER

ANALYTICAL PARAMETERS

ANALYSIS	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
VOCs		HCl	4 x 40 mL	X	
Total lead		HNO_3	1 x 250 mL	X	
Diss metals		HNO_3	1 x 250 mL	X	

Note: Bailed water before purge had noticeable sheen + odor.

1 well volume = 1.89 gal

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED (YES) NO

NOTES:

SIGNATURE: David Chapman

CHECKED BY: David Chapman

LOW FLOW GROUNDWATER DATA RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004

MACTEC, Inc.

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FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

JOB NUMBER 361804.8123

PROJECT 94th RRC Lincoln, RI | FIELD SAMPLE NUMBER MW-20D | EVENT NO. 1

SITE ID Site 04 | SITE TYPE — | DATE 5.31.07

ACTIVITY START 1010 END 1125 | SAMPLE TIME 1120 | FILE TYPE 1 —

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: [✓] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	5.53 FT	HISTORICAL WELL DEPTH (TOR)	20 FT	PROTECTIVE CASING STICKUP (FROM GROUND)	— FT
FINAL DEPTH TO WATER	5.59 FT	PID AMBIENT AIR	0.0 PPM	CASING / WELL DIFFERENCE	— FT
SCREEN LENGTH	10 FT	PRESSURE TO PUMP	— PSI	PID WELL MOUTH	2.7 PPM
TOTAL VOL. PURGED	2 GAL	REFILL SETTING	—	DISCHARGE SETTING	—
				WELL DIAMETER	1 IN

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY:

INTEGRITY:	YES	NO	N/A
CAP	X		
CASING	X		
LOCKED	X		
COLLAR	X		

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (+/- deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	DO (mg/L)	TURBIDITY (ntu)	REDOX (+/- mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
1015	Begin bailing									
1120	collect sample				RI22-MWS20D01					

EQUIPMENT DOCUMENTATION

TYPE OF PUMP: [ ] BLADDER [ ] PERISTALTIC [X] OTHER bailer

TYPE OF TUBING: [ ] HIGH DENSITY POLYETHYLENE [ ] OTHER _____

TYPE OF PUMP MATERIAL: [ ] STAINLESS STEEL [ ] OTHER _____

TYPE OF BLADDER MATERIAL: [ ] TEFLON [ ] OTHER _____

ANALYTICAL PARAMETERS

ANALYSIS	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
VOC	8260	HCl	3 x 40mL	✓	~~RI22-MW20DS01~~ (pm) RI22-MWS20D01

PURGE OBSERVATIONS: no odor or sheen

PURGE WATER CONTAINERIZED (YES) NO _____

NOTES:

SIGNATURE: _____

CHECKED BY: _____

LOW FLOW GROUNDWATER DATA RECORD
QUALITY ASSURANCE PROJECT PLAN
94th RRC 2004
MACTEC, Inc.

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APPENDIX F

FIELD DATA RECORDS – LOW-FLOW GROUNDWATER SAMPLING

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: AMSA 68/GI Lincoln, RI | FIELD SAMPLE ID: RI68-GWSMW1-[illegible] | JOB NUMBER: 361804B123.02

LOCATION ID: MW-1 | TRIP BLANK: TB-1 | EVENT NO: 2

ACTIVITY: START [illegible] END 1345 | SAMPLE TIME: [illegible]3 | DATE: [illegible]

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: [X] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	7.63 feet	~~HISTORICAL~~ WELL DEPTH (TOR)	21.[illegible] feet	PROTECTIVE CASING STICKUP (FROM GROUND)	— feet
FINAL DEPTH TO WATER	8.46 feet	PID AMBIENT AIR	0.0 ppmv	CASING / WELL DIFFERENCE	— feet
SCREEN LENGTH	10 feet	PRESSURE TO PUMP	— psi	PID WELL MOUTH	0.0 ppmv	WELL DIAMETER	2 inches
TOTAL VOL. PURGED	1.44 gallons	REFILL SETTING	—	DISCHARGE SETTING	—

(purge volume (ml or liters per minute) x time duration (minutes) x 0.00026 gal/ml or liter)

WELL INTERGRITY

INTEGRITY	YES	NO	N/A
CAP	X		
CASING	X		
LOCKED		X	
COLLAR			X

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (mL/min)	TEMP. (C°)	SPECIFIC CONDUCTIVITY (mS/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (NTU)	REDOX (+/- mV)	PUMP INTAKE DEPTH (ft)	COMMENTS
1241	Begin	Purging								
1245	8.15	150	17.17	0.147	5.33	4.01	8.14	111		
1250	8.34	145	16.13	0.142	5.24	4.52	6.18	221		
1255	8.38	145	16.45	0.142	5.27	4.13	5.74	242		
1300	8.41	140	16.57	0.140	5.30	4.11	5.25	252		
1305	8.44	140	16.64	0.137	5.29	4.04	4.84	258		
1310	8.44	140	16.69	0.137	5.46	3.96	4.52	261		
1315	8.46	150	16.79	0.137	5.47	4.15	4.13	264		
1320	8.46	150	16.85	0.137	5.50	4.27	4.07	272		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP

[ ] DEDICATED MARSCHALK BLADDER
[ ] NON-DEDICATED MARSCHALK BLADDER
[X] OTHER PERISTALTIC

TYPE OF TUBING

[X] HIGH DENSITY POLYETHYLENE
[ ] OTHER

ANALYTICAL PARAMETERS

CONTROL NUMBER

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
[X] VOCs	8260B	HCl / 4 C°	3 X 40 mL	[X]	___/___/___
[ ] VOCs 5 mL Purge	8260B w/ MTBE and TICs	HCl / 4 C°	3 X 40 mL	[ ]	___/___/___
[ ] PESTICIDES (PESTICIDES ONLY)	8081	4 C°	2 X 1 L AG	[ ]	___/___
[ ] SULFATE / CHLORIDE / ALKALINITY	USEPA 374.5 / 325.2 / 310.1	4 C°	1 x 1 L P	[ ]	___
[ ] SULFATE / ALKALINITY	USEPA 374.5 / 310.1	4 C°	1 x 1 L P	[ ]	___
[ ] NO_3 + NO_2	USEPA 353.2	H_2SO_4 to pH <2	1 X 500 mL P	[ ]	___
[ ] TOC	USEPA 415.1	H_2SO_4 to pH <2	1 X 250 mL AG	[ ]	___
[ ] MANGANESE - FIELD FILTERED	SW846 6010	HNO_3 to pH <2	1 X 500 mL P	[ ]	___
[ ] METHANE / ETHANE / ETHYLENE	RSK 175	HCl / 4 C°	3 X 40 mL	[ ]	___/___/___
[ ] FERROUS IRON	FIELD METHOD	RESULT =			
[ ] HYDROGEN SULFIDE	FIELD METHOD	RESULT =			
[ ] DISSOLVED OXYGEN	FIELD METHOD - MODIFIED WINKLER	RESULT =			

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES NO

LOCATION NOTES

NOTES:

SIGNATURE

Checked By:

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT	AMSA 68(G) Lincoln, RI	FIELD SAMPLE ID	—	JOB NUMBER	3616048123.02
LOCATION ID	MW-2	TRIP BLANK	—	EVENT NO	02
ACTIVITY	START 1417 END 1523	SAMPLE TIME	—	DATE	6/25/07

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT
- [X] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	7.10 feet	~~HISTORICAL~~ WELL DEPTH (TOR)	feet	PROTECTIVE CASING STICKUP (FROM GROUND)	— feet
FINAL DEPTH TO WATER	14.55 feet	PRESSURE TO PUMP	— psi	PID AMBIENT AIR	0.0 ppmv
SCREEN LENGTH	10 feet	REFILL SETTING	—	PID WELL MOUTH	~~15.0~~ 0.0 ppmv
TOTAL VOL. PURGED	4.45 gallons			DISCHARGE SETTING	—

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

CASING / WELL DIFFERENCE: — feet

WELL DIAMETER: 2 inches

WELL INTEGRITY:

INTEGRITY	YES	NO	N/A
CAP	X		
CASING	X		
LOCKED		X	
COLLAR			X

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (mL/min)	TEMP (C°)	SPECIFIC CONDUCTIVITY (mS/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (NTU)	REDOX (+/- mV)	PUMP INTAKE DEPTH (ft)	COMMENTS
1417	Begin purging									
1428	Stop pump because flow rate is not consistent. Change silicone tubing to different diameter.									
1429	Restart pump.									
1435	8.19	160	16.33	0.363	5.94	0.00	101	111		
1440	8.50	130	16.10	0.362	6.04	0.00	88.3	107		
1445	8.62	90	17.04	0.357	6.14	0.00	8.84	108		
1450	8.79	90	16.45	0.358	6.16	0.00	717	108		
1452	Well has drawn down > 1/3 foot and is not recharging; therefore increase flow rate and purge well dry									
1455	9.84	500	14.61	0.362	6.27	0.00	5.33 ~~717~~	79		
1500	11.35	400	14.15	0.368	6.35	0.00	16.7	55		
1510	12.20	400	13.55	0.353	6.56	0.00	32.9	74		
1515	13.05	400	13.09	0.353	6.51	0.00	26.0	73		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] DEDICATED MARSCHALK BLADDER
- [ ] NON-DEDICATED MARSCHALK BLADDER
- [X] OTHER __ PERISTALTIC

TYPE OF TUBING
- [X] HIGH DENSITY POLYETHYLENE
- [ ] OTHER ____________

ANALYTICAL PARAMETERS

CONTROL NUMBER ____________

CONTROL NUMBER	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
[X] VOCs	8260B	HCl / 4 C°	3 X 40 mL	[ ]	___/___/___
[ ] VOCs 5 mL Purge	8260B w / MTBE and TICs	HCl / 4 C°	3 X 40 mL	[ ]	___/___/___
[ ] PESTICIDES (PESTICIDES ONLY)	8081	4 C°	2 X 1 L AG	[ ]	___/___
[ ] SULFATE / CHLORIDE / ALKALINITY	USEPA 374.5 / 325.2 / 310.1	4 C°	1 x 1 L P	[ ]	___
[ ] SULFATE / ALKALINITY	USEPA 374.5 / 310.1	4 C°	1 x 1 L P	[ ]	___
[ ] NO_2 - NO_3	USEPA 353.2	H_2SO_4 to pH <2	1 X 500 mL P	[ ]	___
[ ] TOC	USEPA 415.1	H_2SO_4 to pH <2	1 X 250 mL AG	[ ]	___
[ ] MANGANESE - FIELD FILTERED	SW846 6010	HNO_3 to pH <2	1 X 500 mL P	[ ]	___
[ ] METHANE / ETHANE / ETHYLENE	RSK 175	HCl / 4 C°	3 X 40 mL	[ ]	___/___/___
[ ] FERROUS IRON	FIELD METHOD	RESULT = ______			
[ ] HYDROGEN SULFIDE	FIELD METHOD	RESULT = ______			
[ ] DISSOLVED OXYGEN	FIELD METHOD - MODIFIED WINKLER	RESULT = ______			

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: (YES) NO

LOCATION NOTES

NOTES:

SIGNATURE [signature]

Checked By:

MACTEC, Inc.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: AMSA 68(G) Lincoln, RI | FIELD SAMPLE ID: — | JOB NUMBER: 3618048123.02

LOCATION ID: MW-2 | TRIP BLANK: — | EVENT NO: 2

ACTIVITY: START 1417 END 1523 | SAMPLE TIME: — | DATE: 6/25/17

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: [X] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	7.10 feet	~~HISTORICAL~~ WELL DEPTH (TOR)	feet	PROTECTIVE CASING STICKUP (FROM GROUND)	— feet
FINAL DEPTH TO WATER	14.55 feet	PID AMBIENT AIR	0.0 ppmv	CASING / WELL DIFFERENCE	— feet
SCREEN LENGTH	10 feet	PRESSURE TO PUMP	— psi	PID WELL MOUTH	1.5 ppmv (DEL)
TOTAL VOL PURGED	4.75 gallons	REFILL SETTING	—	DISCHARGE SETTING	—
				WELL DIAMETER	2 inches

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY

INTEGRITY:	YES	NO	N/A
CAP	X		
CASING	X		
LOCKED		X	
COLLAR			X

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (mL/min)	TEMP (C°)	SPECIFIC CONDUCTIVITY (mS/cm)	pH (units)	DISS O2 (mg/L)	TURBIDITY (NTU)	REDOX (+/- mV)	PUMP INTAKE DEPTH (ft)	COMMENTS
1520	14.18	400	13.49	0.361	6.52	0.00	15.1	43		
1523	Stop pump to clean up. Final DTW = 14.55									
	Well was not been purged dry Will resume activities									
	at MW-2 tomorrow.									

EQUIPMENT DOCUMENTATION

TYPE OF PUMP

[ ] DEDICATED MARSCHALK BLADDER [X] OTHER PERISTALTIC

[ ] NON-DEDICATED MARSCHALK BLADDER

TYPE OF TUBING

[X] HIGH DENSITY POLYETHYLENE [ ] OTHER

ANALYTICAL PARAMETERS

CONTROL NUMBER _____

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
[X] VOCs	8260B	HCl / 4 C°	3 X 40 mL	[ ]	___/___/___
[ ] VOCs 5 mL Purge	8260B w / MTBE and TICs	HCl / 4 C°	3 X 40 mL	[ ]	___/___/___
[ ] PESTICIDES (PESTICIDES ONLY)	8051	4 C°	2 X 1 L AG	[ ]	___/___
[ ] SULFATE / CHLORIDE / ALKALINITY	USEPA 374.5 / 325.2 / 310.1	4 C°	1 x 1 L P	[ ]	___
[ ] SULFATE / ALKALINITY	USEPA 374.5 / 310.1	4 C°	1 x 1 L P	[ ]	___
[ ] NO_3 / NO_2	USEPA 353.2	H_2SO_4 to pH <2	1 X 500 mL P	[ ]	___
[ ] TOC	USEPA 415.1	H_2SO_4 to pH <2	1 X 250 mL AG	[ ]	___
[ ] MANGANESE - FIELD FILTERED	SW846 6010	HNO_3 to pH <2	1 X 500 mL P	[ ]	___
[ ] METHANE / ETHANE / ETHYLENE	RSK 175	HCl / 4 C°	3 X 40 mL	[ ]	___/___/___
[ ] FERROUS IRON	FIELD METHOD	RESULT =			
[ ] HYDROGEN SULFIDE	FIELD METHOD	RESULT =			
[ ] DISSOLVED OXYGEN	FIELD METHOD - MODIFIED WINKLER	RESULT =			

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED YES NO

LOCATION NOTES

NOTES:

SIGNATURE

Checked By

MACTEC Inc

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: AMSA 68(G) Lincoln, RI | FIELD SAMPLE ID: [illegible] | JOB NUMBER: 3618048123.02

LOCATION ID: [illegible] | TRIP BLANK: TB-1 | EVENT NO: 2

ACTIVITY: START 0708 END 0920 | SAMPLE TIME: [illegible] | DATE: 6/22/17

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: [X] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	7.32 feet	PROTECTIVE CASING STICKUP (FROM GROUND)	— feet	CASING / WELL DIFFERENCE	— feet
FINAL DEPTH TO WATER	10.65 feet	~~HISTORICAL~~ WELL DEPTH (TOR)	20.96 feet	WELL DIAMETER	2 inches
SCREEN LENGTH	10 feet	PRESSURE TO PUMP	— psi	PID AMBIENT AIR	0.0 ppmv
TOTAL VOL PURGED	1.59 gallons	REFILL SETTING	—	PID WELL MOUTH	1.5 ppmv
				DISCHARGE SETTING	—

(purge volume (milliliters per minute) x time (duration in minutes) x 0.00026 gallons/liter)

WELL INTEGRITY

INTEGRITY	YES	NO	N/A
CAP	X	—	—
CASING	X	—	—
LOCKED	—	X	—
COLLAR	—	—	X

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (mL/min)	TEMP (°C)	SPECIFIC CONDUCTIVITY (mS/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (NTU)	REDOX (+/- mV)	PUMP INTAKE DEPTH (ft)	COMMENTS
0803	Begin	Purging								
0810	8.10	150	16.99	0.304	6.45	3.01	8.78	85		
0820	8.45	110	17.18	0.311	6.46	2.28	8.39	81		
0830	8.80	110	17.50	0.312	6.47	2.01	9.33	79		
0832	9.12	110	17.41	0.315	6.47	2.01	9.81	67		
0835	9.37	110	17.11	0.313	6.44	2.17	11.4	67		
0840	9.70	110	17.11	0.319	6.43	2.95	10.3	73		
0845	9.97	110	17.88	0.315	6.43	4.72	10.1	74		
0850	10.21	110	18.24	0.314	6.42	7.41	9.20	85		
0855	10.41	110	18.41	0.313	6.40	9.15	9.06	84		
0900	10.63	110	18.17	0.312	6.39	9.31	8.52	93		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP

[ ] DEDICATED MARSCHALK BLADDER [X] OTHER PERISTALTIC

[ ] NON-DEDICATED MARSCHALK BLADDER

TYPE OF TUBING

[X] HIGH DENSITY POLYETHYLENE

[ ] OTHER _____

ANALYTICAL PARAMETERS

CONTROL NUMBER _____

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
[X] VOCs	8260B	HCl / 4 C°	3 X 40 mL	[X]	___/___/___
[ ] VOCs 5 mL Purge	8260B w/ MTBE and TICs	HCl / 4 C°	3 X 40 mL	[ ]	___/___/___
[ ] PESTICIDES (PESTICIDES ONLY)	8081	4 C°	2 X 1 L AG	[ ]	___/___
[ ] SULFATE / CHLORIDE / ALKALINITY	USEPA 374.5 / 325.2 / 310.1	4 C°	1 x 1 L P	[ ]	___
[ ] SULFATE / ALKALINITY	USEPA 374.5 / 310.1	4 C°	1 x 1 L P	[ ]	___
[ ] NO_3 - NO_2	USEPA 353.2	H_2SO_4 to pH <2	1 X 500 mL P	[ ]	___
[ ] TOC	USEPA 415.1	H_2SO_4 to pH <2	1 X 250 mL AG	[ ]	___
[ ] MANGANESE - FIELD FILTERED	SW846 6010	HNO_3 to pH <2	1 X 500 mL P	[ ]	___
[ ] METHANE / ETHANE / ETHYLENE	RSK 175	HCl / 4 C°	3 X 40 mL	[ ]	___/___/___
[ ] FERROUS IRON	FIELD METHOD	RESULT = _____			
[ ] HYDROGEN SULFIDE	FIELD METHOD	RESULT = _____			
[ ] DISSOLVED OXYGEN	FIELD METHOD - MODIFIED WINKLER	RESULT = _____			

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED (YES) NO _____

LOCATION NOTES

NOTES:

SIGNATURE: [signature]

Checked By: _____ DATED: _____

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: AMSA 68(G) Lincoln, RI | FIELD SAMPLE ID: [illegible] | JOB NUMBER: 361B048123.02

LOCATION ID: MW-5 | TRIP BLANK: TB-2 | EVENT NO: 03

ACTIVITY: START 1240 (SAMPLE) END 0800 (SAMPLE) | SAMPLE TIME: 0755 | DATE: 6-26-07

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: [✓] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	7.42 feet	PROTECTIVE CASING STICKUP (FROM GROUND)	— feet	CASING / WELL DIFFERENCE	— feet
FINAL DEPTH TO WATER	8.89 feet	HISTORICAL WELL DEPTH (TOR)	17.0 feet	WELL DIAMETER	2.0 inches
SCREEN LENGTH	10 feet	PRESSURE TO PUMP	— psi	P.D AMBIENT AIR	0.0 ppmv
TOTAL VOL PURGED	1.78 gallons	REFILL SETTING	—	P.D WELL MOUTH	4.0 ppmv
				DISCHARGE SETTING	—

(purge volume (milliliters per minute) x time duration (in minutes) x 0.00026 gal/milliliter)

WELL INTEGRITY:

INTEGRITY:	YES	NO	N/A
CAP	✓	—	—
CASING	✓	—	—
LOCKED	✓	—	—
COLLAR	✓	—	—

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (mL/min)	TEMP (C°)	SPECIFIC CONDUCTIVITY (mS/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (NTU)	REDOX (+/- mV)	PUMP INTAKE DEPTH (ft)	COMMENTS
1240	Begin	Purging								
1245	8.50	100	Error	0.336	6.65	5.51	321	-176		
1250	6.30	100	17.3	0.331	6.60	4.72	304	-176		
1255	7.96	90	17.2	0.341	6.62	4.34	274	-176		
1300	10.53	90	17.2	0.340	6.63	3.72	297	-179		
1305	11.34	90	16.6	0.350	6.61	3.42	350	-175		
1310	11.55	90	16.7	0.326	6.51	3.00	249	-171		
1315	12.24	90	16.7	0.346	6.56	2.75	243	-169		
1320	13.05	90	16.5	0.350	6.51	2.46	255	-165		
1325	13.67	90	16.7	0.270	6.49	2.66	202	-148		
1330	14.23	90	16.4	0.256	6.44	2.53	238	-134		
1335	14.87	90	16.5	0.247	6.40	2.38	234	-123		Turned up pump to purge wetter
1340	16.25	200	14.0	0.247	6.37	2.36	513	-107		
1345	Well	purged	dry							

EQUIPMENT DOCUMENTATION

TYPE OF PUMP

[ ] DEDICATED MARSCHALK BLADDER
[✓] OTHER PERISTALTIC
[ ] NON-DEDICATED MARSCHALK BLADDER

TYPE OF TUBING

[✓] HIGH DENSITY POLYETHYLENE
[ ] OTHER

ANALYTICAL PARAMETERS

CONTROL NUMBER

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
[✓] VOCs	8260B	HCl / 4 C°	3 X 40 mL	[3]	/ /
[ ] VOCs 5 mL Purge	8260B w / MTBE and TICs	HCl / 4 C°	3 X 40 mL	[ ]	/ /
[ ] PESTICIDES (PESTICIDES ONLY)	8081	4 C°	2 X 1 L AG	[ ]	/
[ ] SULFATE / CHLORIDE / ALKALINITY	USEPA 374.5 / 325.2 / 310.1	4 C°	1 x 1 L P	[ ]	
[ ] SULFATE / ALKALINITY	USEPA 374.5 / 310.1	4 C°	1 x 1 L P	[ ]	
[ ] NO_2 - NO_3	USEPA 353.2	H_2SO_4 to pH <2	1 X 500 mL P	[ ]	
[ ] TOC	USEPA 415.1	H_2SO_4 to pH <2	1 X 250 mL AG	[ ]	
[ ] MANGANESE - FIELD FILTERED	SW846 6010	HNO_3 to pH <2	1 X 500 mL P	[ ]	
[ ] METHANE / ETHANE / ETHYLENE	RSK 175	HCl / 4 C°	3 X 40 mL	[ ]	/ /
[ ] FERROUS IRON	FIELD METHOD	RESULT =			
[ ] HYDROGEN SULFIDE	FIELD METHOD	RESULT =			
[ ] DISSOLVED OXYGEN	FIELD METHOD - MODIFIED WINKLER	RESULT =			

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED (YES) NO

LOCATION NOTES

NOTES:

SIGNATURE

Checked By:

MACTEC, Inc.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT	AMSA 68(G) Lincoln, RI	FIELD SAMPLE ID	RI2-GWSMW802	JOB NUMBER	3618048123.02
LOCATION ID	MW-8	TRIP BLANK	TB-2	EVENT NO	02
ACTIVITY	START 0745 END	SAMPLE TIME	0755	DATE	6/27/07

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: [✓] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	7.54 ft	PROTECTIVE CASING STICKUP (FROM GROUND)	— feet	CASING / WELL DIFFERENCE	— feet
FINAL DEPTH TO WATER	feet	~~HISTORICAL~~ WELL DEPTH (TOR)	17.6 feet	WELL DIAMETER	2.0 inches
SCREEN LENGTH	10 feet	PRESSURE TO PUMP	— psi	PID AMBIENT AIR	0.0 ppmv
TOTAL VOL PURGED	gallons	REFILL SETTING	—	PID WELL MOUTH	4.0 ppmv
				DISCHARGE SETTING	—

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTEGRITY

WELL INTEGRITY	YES	NO	NA
CAP	✓		
CASING	✓		
LOCKED	✓		
COLLAR	✓		

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (mL/min)	TEMP (C)	SPECIFIC CONDUCTIVITY (mS/cm)	pH (units)	DISS O2 (mg/L)	TURBIDITY (NTU)	REDOX (+/- mV)	PUMP INTAKE DEPTH (ft)	COMMENTS
0745	Begin Purging			Initial DTW = 7.54 ft						
0750	8.39	160	16.2	0.431	6.41	0.81	6.86	-16.9		
0755	Sample T									

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] DEDICATED MARSCHALK BLADDER
- [ ] NON-DEDICATED MARSCHALK BLADDER
- [✓] OTHER PERISTALTIC

TYPE OF TUBING
- [✓] HIGH DENSITY POLYETHYLENE
- [ ] OTHER _____

ANALYTICAL PARAMETERS

CONTROL NUMBER _____

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
[✓] VOCs	8260B	HCl / 4 C°	3 X 40 mL	[3]	___/___/___
[ ] VOCs 5 mL Purge	8260B w/ MTBE and TICs	HCl / 4 C°	3 X 40 mL	[ ]	___/___/___
[ ] PESTICIDES (PESTICIDES ONLY)	8081	4 C°	2 X 1 L AG	[ ]	___/___
[ ] SULFATE / CHLORIDE / ALKALINITY	USEPA 374.5 / 325.2 / 310.1	4 C°	1 x 1 L P	[ ]	___
[ ] SULFATE / ALKALINITY	USEPA 374.5 / 310.1	4 C°	1 x 1 L P	[ ]	___
[ ] NO_3 / NO_2	USEPA 353.2	H_2SO_4 to pH <2	1 X 500 mL P	[ ]	___
[ ] TOC	USEPA 415.1	H_2SO_4 to pH <2	1 X 250 mL AG	[ ]	___
[ ] MANGANESE - FIELD FILTERED	SW846 6010	HNO_3 to pH <2	1 X 500 mL P	[ ]	___
[ ] METHANE / ETHANE / ETHYLENE	RSK 175	HCl / 4 C°	3 X 40 mL	[ ]	___/___/___
[ ] FERROUS IRON	FIELD METHOD	RESULT = _____			
[ ] HYDROGEN SULFIDE	FIELD METHOD	RESULT = _____			
[ ] DISSOLVED OXYGEN	FIELD METHOD - MODIFIED WINKLER	RESULT = _____			

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED (YES) NO _____

LOCATION NOTES

NOTES:

SIGNATURE _____

Checked By: _____

UNITED inc

LOW FLOW WS.xls

6/25/2007

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT	AMSA 68(G) Lincoln, RI	FIELD SAMPLE ID	RI27-GW-MW14	JOB NUMBER	3618048123.02
LOCATION ID	MW-14	TRIP BLANK	TB-2	EVENT NO	[illegible]
ACTIVITY	START 0748 END 0914	SAMPLE TIME	0857	DATE	6/27/07

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT
- [X] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	7.64 feet			PROTECTIVE CASING STICKUP (FROM GROUND)	— feet	CASING / WELL DIFFERENCE	— feet
FINAL DEPTH TO WATER	7.92 feet	~~HISTORICAL~~ WELL DEPTH (TOR)	13.59 feet	PID AMBIENT AIR	0.0 ppmv	WELL DIAMETER	1 inches
SCREEN LENGTH	10 feet	PRESSURE TO PUMP	— psi	PID WELL MOUTH	1.2 ppmv		
TOTAL VOL PURGED	2.57 gallons	REFILL SETTING	—	DISCHARGE SETTING	—		

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTEGRITY	YES	NO	N/A
CAP	X		
CASING	X		
LOCKED	X		
COLLAR			X

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (mL/min)	TEMP (C)	SPECIFIC CONDUCTIVITY (mS/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (NTU)	REDOX (+/- mV)	PUMP INTAKE DEPTH (ft)	COMMENTS
0748	Begin	Purging								
0755	7.91	145	16.89	0.474	6.56	0.00	37.5	-97		
0800	7.91	145	16.36	0.450	6.45	0.00	27.4	-95		
0805	7.91	145	15.99	0.433	6.19	0.00	26.0	-85		
0810	7.92	145	15.94	0.422	6.05	0.00	19.2	-80		
0815	7.93	145	15.92	0.416	5.98	0.00	14.3	-78		
0820	7.94	145	15.94	0.413	5.97	0.00	13.0	-77		
0825	7.93	145	16.36	0.412	6.00	0.00	10.2	-79		
0830	7.92	145	16.71	0.409	6.06	0.00	9.60	-83		
0835	7.92	145	16.95	0.408	6.22	0.00	6.92	-92		
0840	7.92	145	17.16	0.407	6.51	0.02	6.37	-106		
0845	7.92	145	17.20	0.406	6.65	0.00	4.98	-113		
0850	7.92	145	17.32	0.406	6.70	0.00	5.14	-114		
0855	7.92	145	17.41	0.405	6.71	0.00	4.72	-115		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] DEDICATED MARSCHALK BLADDER
- [ ] NON-DEDICATED MARSCHALK BLADDER
- [X] OTHER __ PERISTALTIC

TYPE OF TUBING
- [X] HIGH DENSITY POLYETHYLENE
- [ ] OTHER ________

ANALYTICAL PARAMETERS

CONTROL NUMBER ________

PARAMETER	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
[X] VOCs	8260B	HCl / 4 C°	3 X 40 mL	X	/ /
[ ] VOCs 5 mL Purge	8260B w/ MTBE and TICs	HCl / 4 C°	3 X 40 mL		/ /
[ ] PESTICIDES (PESTICIDES ONLY)	8081	4 C°	2 X 1 L AG		/
[ ] SULFATE / CHLORIDE / ALKALINITY	USEPA 374.5 / 325.2 / 310.1	4 C°	1 x 1 L P		
[ ] SULFATE / ALKALINITY	USEPA 374.5 / 310.1	4 C°	1 x 1 L P		
[ ] NO_3 - NO_2	USEPA 353.2	H_2SO_4 to pH <2	1 X 500 mL P		
[ ] TOC	USEPA 415.1	H_2SO_4 to pH <2	1 X 250 mL AG		
[ ] MANGANESE - FIELD FILTERED	SW846 6010	HNO_3 to pH <2	1 X 500 mL P		
[ ] METHANE / ETHANE / ETHYLENE	RSK 175	HCl / 4 C°	3 X 40 mL		/ /
[ ] FERROUS IRON	FIELD METHOD	RESULT =			
[ ] HYDROGEN SULFIDE	FIELD METHOD	RESULT =			
[ ] DISSOLVED OXYGEN	FIELD METHOD - MODIFIED WINKLER	RESULT =			

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED (YES) NO

LOCATION NOTES

NOTES:

SIGNATURE [signature]

Checked By: ________

MACTEC, Inc.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: AMSA 68(G) Lincoln, RI | FIELD SAMPLE ID: RI23-GWSMW14DR2 | JOB NUMBER: 3618048123.02

LOCATION ID: MW-14D | TRIP BLANK: TB-1 | EVENT NO: 2

ACTIVITY: START 1403 END 1509 | SAMPLE TIME: 1453 | DATE: 6/26/07

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: [X] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER: 5.09 feet

FINAL DEPTH TO WATER: 5.50 feet

SCREEN LENGTH: 10 feet

TOTAL VOL. PURGED: 1.55 gallons

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

~~HISTORICAL~~ WELL DEPTH (TOR): 14.27 feet

PRESSURE TO PUMP: — psi

REFILL SETTING: —

PROTECTIVE CASING STICKUP (FROM GROUND): — feet

PID AMBIENT AIR: 0.1 ppmv

PID WELL MOUTH: 1.8 ppmv

DISCHARGE SETTING: —

CASING / WELL DIFFERENCE: — feet

WELL DIAMETER: 1 inches

WELL INTERGRITY:

INTEGRITY	YES	NO	N/A
CAP	X		
CASING	X		
LOCKED		X	
COLLAR	X		

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (mL/min)	TEMP. (C°)	SPECIFIC CONDUCTIVITY (mS/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (NTU)	REDOX (+/- mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
1403	Begin	Purging								
1410	5.49	125	17.43	0.426	6.75	0.00	207	-115		
1415	5.51	125	17.40	0.425	6.75	0.00	443	-118		
1420	5.49	125	17.23	0.426	6.71	0.00	306	-119		
1425	5.49	125	17.29	0.422	6.66	0.00	94.7	-118		
1430	5.51	125	17.22	0.419	6.59	0.00	48.4	-115		
1435	5.50	125	17.11	0.417	6.51	0.00	22.1	-112		
1440	5.50	125	17.24	0.416	6.45	0.00	14.5	-109		
1445	5.50	125	17.07	0.416	6.40	0.00	14.1	-107		
1450	5.50	125	17.11	0.415	6.37	0.00	13.3	-106		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP: [ ] DEDICATED MARSCHALK BLADDER [ ] NON-DEDICATED MARSCHALK BLADDER [X] OTHER PERISTALTIC

TYPE OF TUBING: [X] HIGH DENSITY POLYETHYLENE [ ] OTHER ______

ANALYTICAL PARAMETERS

CONTROL NUMBER ______

PARAMETER	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
[X] VOCs	8260B	HCl / 4 C°	3 X 40 mL	[X]	/ /
[ ] VOCs 5 mL Purge	8260B w/ MTBE and TICs	HCl / 4 C°	3 X 40 mL	[ ]	/ /
[ ] PESTICIDES (PESTICIDES ONLY)	8081	4 C°	2 X 1 L AG	[ ]	/
[ ] SULFATE / CHLORIDE / ALKALINITY	USEPA 374.5 / 325.2 / 310.1	4 C°	1 x 1 L P	[ ]	
[ ] SULFATE / ALKALINITY	USEPA 374.5 / 310.1	4 C°	1 x 1 L P	[ ]	
[ ] NO_2 - NO_3	USEPA 353.2	H_2SO_4 to pH <2	1 X 500 mL P	[ ]	
[ ] TOC	USEPA 415.1	H_2SO_4 to pH <2	1 X 250 mL AG	[ ]	
[ ] MANGANESE - FIELD FILTERED	SW846 6010	HNO_3 to pH <2	1 X 500 mL P	[ ]	
[ ] METHANE / ETHANE / ETHYLENE	RSK 175	HCl / 4 C°	3 X 40 mL	[ ]	/ /
[ ] FERROUS IRON	FIELD METHOD	RESULT =			
[ ] HYDROGEN SULFIDE	FIELD METHOD	RESULT =			
[ ] DISSOLVED OXYGEN	FIELD METHOD - MODIFIED WINKLER	RESULT =			

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: (YES) NO

LOCATION NOTES

NOTES:

SIGNATURE: [signature]

Checked By:

MACTEC, Inc.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT	AMSA 68(G) Lincoln, RI	FIELD SAMPLE ID	[illegible]	JOB NUMBER	36160048123.02
LOCATION ID	MW-15	TRIP BLANK	TB-1	EVENT NO	02
ACTIVITY	START 0815 END 0925	SAMPLE TYPE	GW	DATE	6/26/17

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT
- [x] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	7.51 feet	HISTORICAL WELL DEPTH (TOR)	13.74 feet	PROTECTIVE CASING STICKUP (FROM GROUND)	— feet
FINAL DEPTH TO WATER	7.98 feet	PID AMBIENT AIR	0.0 ppmv	CASING / WELL DIFFERENCE	— feet
SCREEN LENGTH	10 feet	PRESSURE TO PUMP	— psi	PID WELL MOUTH	2.2 ppmv	WELL DIAMETER	1.0 inches
TOTAL VOL PURGED	1.12 gallons	REFILL SETTING	—	DISCHARGE SETTING	—

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTEGRITY

INTEGRITY:	YES	NO	N/A
CAP	✓		
CASING	✓		—
LOCKED	✓	✓	
COLLAR	✓		

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (mL/min)	TEMP (°C)	SPECIFIC CONDUCTIVITY (mS/cm)	pH (units)	DISS O2 (mg/L)	TURBIDITY (NTU)	REDOX (+/- mV)	PUMP INTAKE DEPTH (ft)	COMMENTS
0815	Start Purging									
0820	8.45	100	17.0	0.155	5.61	1.07	11.7	-151		
0825	8.21	100	17.4	0.159	5.73	0.66	10.7	-155		
0830	8.01	100	17.1	0.165	5.76	0.68	8.45	-164		
0840	8.14	80	17.3	0.170	5.84	0.51	7.83	-170		
0845	8.03	80	15.4	0.179	5.82	0.61	6.49	-165		
0850	7.95	80	15.8	0.156	5.81	0.63	5.13	-161		
0855	7.98	80	15.6	0.161	5.80	0.51	5.02	-161		
0900	7.95	80	15.6	0.123	5.80	0.56	4.83	-170		
0905	7.98	80	15.6	0.155	5.81	0.54	4.41	-167		
0910	7.98	80	15.5	0.155	5.81	0.52	4.02	-172		
0920	Sample Time									

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] DEDICATED MARSCHALK BLADDER
- [ ] NON-DEDICATED MARSCHALK BLADDER
- [x] OTHER PERISTALTIC

TYPE OF TUBING
- [x] HIGH DENSITY POLYETHYLENE
- [ ] OTHER

ANALYTICAL PARAMETERS

CONTROL NUMBER _____

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
[x] VOCs	8260B	HCl / 4 C°	3 X 40 mL	[x]	A / B / C
[ ] VOCs 5 mL Purge	8260B w/ MTBE and TICs	HCl / 4 C°	3 X 40 mL	[ ]	/ /
[ ] PESTICIDES (PESTICIDES ONLY)	8081	4 C°	2 X 1 L AG	[ ]	/
[ ] SULFATE / CHLORIDE / ALKALINITY	USEPA 374.5 / 325.2 / 310.1	4 C°	1 x 1 L P	[ ]	
[ ] SULFATE / ALKALINITY	USEPA 374.5 / 310.1	4 C°	1 x 1 L P	[ ]	
[ ] NO_3 - NO_2	USEPA 353.2	H_2SO_4 to pH <2	1 X 500 mL P	[ ]	
[ ] TOC	USEPA 415.1	H_2SO_4 to pH <2	1 X 250 mL AG	[ ]	
[ ] MANGANESE - FIELD FILTERED	SW846 6010	HNO_3 to pH <2	1 X 500 mL P	[ ]	
[ ] METHANE / ETHANE / ETHYLENE	RSK 175	HCl / 4 C°	3 X 40 mL	[ ]	/ /
[ ] FERROUS IRON	FIELD METHOD	RESULT =			
[ ] HYDROGEN SULFIDE	FIELD METHOD	RESULT =			
[ ] DISSOLVED OXYGEN	FIELD METHOD - MODIFIED WINKLER	RESULT =			

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED (YES) NO

LOCATION NOTES

Lock missing, had to cut off to sample well

NOTES:

SIGNATURE: [signature]

Checked By: MACTEC Inc

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT	AMSA 66(G) Lincoln, RI	FIELD SAMPLE ID	[illegible]	JOB NUMBER	0618046123.02
LOCATION ID	MW-15D	TRIP BLANK	TB-1	EVENT NO	02
ACTIVITY	START 1405 END 1530	SAMPLE TIME	15:08	DATE	[illegible]

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT
- [x] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	5.02 feet	PROTECTIVE CASING STICKUP (FROM GROUND)	— feet	CASING / WELL DIFFERENCE	— feet
FINAL DEPTH TO WATER	5.42 feet	~~HISTORICAL~~ WELL DEPTH (TOR)	14.65 feet	PID AMBIENT AIR	0.0 ppmv
SCREEN LENGTH	5 feet	PRESSURE TO PUMP	— psi	PID WELL MOUTH	4.4 ppmv
TOTAL VOL PURGED	1.67 gallons	REFILL SETTING	—	DISCHARGE SETTING	—

WELL DIAMETER: 1.0 inches

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY

INTEGRITY	YES	NO	N/A
CAP	✓		
CASING			✓
LOCKED		✓	
COLLAR	✓		

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (mL/min)	TEMP (C°)	SPECIFIC CONDUCTIVITY (mS/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (NTU)	REDOX (+/- mV)	PUMP INTAKE DEPTH (ft)	COMMENTS
1405	Begin Purging									
1410	5.67	160	17.5	0.401	6.14	[illegible]	23.6	-75		
1415	5.48	75	18.4	0.395	6.14	5.34	8.50	-108		
1420	5.48	75	19.0	0.393	6.14	2.42	9.50	-124		
1425	5.56	75	19.0	0.393	6.13	8.36	19.0	-129		
1430	5.54	75	18.5	0.393	6.12	1.94	11.5	-130		
1435	5.56	75	18.7	0.392	6.13	7.60	1.92	-132		
1440	5.51	75	18.8	0.391	6.13	7.58	10.0	-134		
1445	5.55	75	18.6	0.391	6.15	7.83	7.11	-125		
1450	5.50	75	18.4	0.392	6.12	7.6	5.15	-133		
1455	5.43	75	18.5	0.388	6.12	6.68	2.05	-137		
1500	5.43	75	18.5	0.403	6.13	6.12	4.29	-131		
1505	5.38	75	18.8	0.396	6.14	2.46	—	-128		
1515	5.44	75	19.4	0.384	6.13	6.76	1.58	-123		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] DEDICATED MARSCHALK BLADDER
- [ ] NON-DEDICATED MARSCHALK BLADDER
- [x] OTHER __ PERISTALTIC

TYPE OF TUBING
- [x] HIGH DENSITY POLYETHYLENE
- [ ] OTHER ______

ANALYTICAL PARAMETERS

CONTROL NUMBER ______

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
[x] VOCs	8260B	HCl / 4 C°	3 X 40 mL	3	___/___/___
[ ] VOCs 5 mL Purge	8260B w / MTBE and TICs	HCl / 4 C°	3 X 40 mL		___/___/___
[ ] PESTICIDES (PESTICIDES ONLY)	8081	4 C°	2 X 1 L AG		___/___
[ ] SULFATE / CHLORIDE / ALKALINITY	USEPA 374.5 / 325.2 / 310.1	4 C°	1 x 1 L P		___
[ ] SULFATE / ALKALINITY	USEPA 374.5 / 310.1	4 C°	1 x 1 L P		___
[ ] NO_2 - NO_3	USEPA 353.2	H_2SO_4 to pH <2	1 X 500 mL P		___
[ ] TOC	USEPA 415.1	H_2SO_4 to pH <2	1 X 250 mL AG		___
[ ] MANGANESE - **FIELD FILTERED**	SW846 6010	HNO_3 to pH <2	1 X 500 mL P		___
[ ] METHANE / ETHANE / ETHYLENE	RSK 175	HCl / 4 C°	3 X 40 mL		___/___/___
[ ] FERROUS IRON	FIELD METHOD	RESULT = ______			
[ ] HYDROGEN SULFIDE	FIELD METHOD	RESULT = ______			
[ ] DISSOLVED OXYGEN	FIELD METHOD - MODIFIED WINKLER	RESULT = ______			

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED (YES) NO

LOCATION NOTES

NOTES:

SIGNATURE [signature]

Checked By

MACTEC, Inc

LOWFLOW[illegible] 6-2-2007

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT	AMSA 68(G) Lincoln, RI	FIELD SAMPLE ID	RI23 GWSMW15D01	JOB NUMBER	3616048123.02
LOCATION ID	MW 15D	TRIP BLANK	TB 1	EVENT NO	02
ACTIVITY	START 1405 END 1530	SAMPLE TIME	1530	DATE	6-25-07

WATER LEVEL / PUMP SETTINGS

INITIAL DEPTH TO WATER: 5.02 feet

MEASUREMENT POINT:
- [x] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING

PROTECTIVE CASING STICKUP (FROM GROUND): -- feet

CASING / WELL DIFFERENCE: — feet

FINAL DEPTH TO WATER: 5.42 feet

HISTORICAL WELL DEPTH (TOR): 14.65 feet

PID AMBIENT AIR: 0.0 ppmv

WELL DIAMETER: 1.0 inches

SCREEN LENGTH: 5 feet

PRESSURE TO PUMP: — psi

PID WELL MOUTH: 4.9 ppmv

TOTAL VOL PURGED: gallons

REFILL SETTING: —

DISCHARGE SETTING: —

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTEGRITY

	YES	NO	N/A
CAP	✓		
CASING			✓
LOCKED		✓	
COLLAR	✓		

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (mL/min)	TEMP. (C°)	SPECIFIC CONDUCTIVITY (mS/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (NTU)	REDOX (+/-mV)	PUMP INTAKE DEPTH (ft)	COMMENTS
1520	5.42	75	15.31	0.315	6.11	6.19	7.91	+151		
1525	5.42	75	15.2	0.310	6.11	5.09	2.61	+135		
1528	5.42	75	15.6	0.310	6.12	5.71	0.54	+135		
1528	Sample Time									

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] DEDICATED MARSCHALK BLADDER
- [ ] NON-DEDICATED MARSCHALK BLADDER
- [x] OTHER __ PERISTALTIC

TYPE OF TUBING
- [x] HIGH DENSITY POLYETHYLENE
- [ ] OTHER ____________

ANALYTICAL PARAMETERS

CONTROL NUMBER ____________

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
[x] VOCs	8260B	HCl / 4 C°	3 X 40 mL	[3]	____/____/____
[ ] VOCs 5 mL Purge	8260B w / MTBE and TICs	HCl / 4 C°	3 X 40 mL	[ ]	____/____/____
[ ] PESTICIDES (PESTICIDES ONLY)	8081	4 C°	2 X 1 L AG	[ ]	____/____
[ ] SULFATE / CHLORIDE / ALKALINITY	USEPA 374.5 / 325.2 / 310.1	4 C°	1 x 1 L P	[ ]	____
[ ] SULFATE / ALKALINITY	USEPA 374.5 / 310.1	4 C°	1 x 1 L P	[ ]	____
[ ] NO_2 - NO_3	USEPA 353.2	H_2SO_4 to pH <2	1 X 500 mL P	[ ]	____
[ ] TOC	USEPA 415.1	H_2SO_4 to pH <2	1 X 250 mL AG	[ ]	____
[ ] MANGANESE - **FIELD FILTERED**	SW846 6010	HNO_3 to pH <2	1 X 500 mL P	[ ]	____
[ ] METHANE / ETHANE / ETHYLENE	RSK 175	HCl / 4 C°	3 X 40 mL	[ ]	____/____/____
[ ] FERROUS IRON	FIELD METHOD	RESULT = ____________			
[ ] HYDROGEN SULFIDE	FIELD METHOD	RESULT = ____________			
[ ] DISSOLVED OXYGEN	FIELD METHOD - MODIFIED WINKLER	RESULT = ____________			

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED (YES) NO

NOTES:

SIGNATURE [signature]

Checked By

LOCATION NOTES

Not all parameters stable for last three readings. Had to leave site for day (1530), so sample was collected.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: AMSA 68(G) Lincoln, RI | FIELD SAMPLE ID: RI22-GWSMW2002 | JOB NUMBER: 3618048123.02

LOCATION ID: MW-20 | TRIP BLANK: TB-2 | EVENT NO: 2

ACTIVITY: START 1715 END 1820 | SAMPLE TIME: 1808 | DATE: 6/26/02

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: [X] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	6.58 feet	PROTECTIVE CASING STICKUP (FROM GROUND)	— feet	CASING / WELL DIFFERENCE	— feet
FINAL DEPTH TO WATER	7.05 feet	HISTORICAL WELL DEPTH (TOR)	11.96 feet	P.I.D AMBIENT AIR	0.0 ppmv
SCREEN LENGTH	10 feet	PRESSURE TO PUMP	— psi	WELL DIAMETER	1 inches
TOTAL VOL. PURGED	1.17 gallons	REFILL SETTING	—	P.I.D WELL MOUTH	1.2 ppmv
				DISCHARGE SETTING	—

(purge volume (milliliters per minute) x time duration (minutes) x 0.00020 gal/milliliter)

WELL INTEGRITY

INTEGRITY	YES	NO	N/A
CAP	X		
CASING			X
LOCKED		X	
COLLAR	X		

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/min)	TEMP (C°)	SPECIFIC CONDUCTIVITY (mS/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (NTU)	REDOX (+/- mV)	PUMP INTAKE DEPTH (ft)	COMMENTS
1715	Begin	Purging								
1720	6.48	85	17.99	0.287	5.57	0.34	91.2	204		
1725	7.00	85	18.09	0.288	5.54	0.26	71.7	209		
1730	7.01	85	17.92	0.298	5.56	5.09	43.3	213		
1735	7.02	90	17.59	0.301	5.60	2.43	32.8	220		
1740	7.03	90	17.52	0.305	5.62	2.41	15.4	222		
1745	7.03	90	17.71	0.303	5.65	2.44	4.65	223		
1750	7.03	90	17.44	0.305	5.68	1.45	6.01	224		
1755	7.04	90	17.37	0.307	5.71	1.41	3.97	223		
1800	7.05	90	17.21	0.301	5.77	1.80	3.64	220		
1805	7.05	90	16.98	0.305	5.79	1.75	3.72	221		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP

[ ] DEDICATED MARSCHALK BLADDER [X] OTHER PERISTALTIC

[ ] NON-DEDICATED MARSCHALK BLADDER

TYPE OF TUBING

[X] HIGH DENSITY POLYETHYLENE

[ ] OTHER _____

ANALYTICAL PARAMETERS

CONTROL NUMBER _____

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
[X] VOCs	8260B	HCl / 4 C°	3 X 40 mL	[X]	/ /
[ ] VOCs 5 mL Purge	8260B w / MTBE and TICs	HCl / 4 C°	3 X 40 mL	[ ]	/ /
[ ] PESTICIDES (PESTICIDES ONLY)	8081	4 C°	2 X 1 L AG	[ ]	/
[ ] SULFATE / CHLORIDE / ALKALINITY	USEPA 374.5 / 325.2 / 310.1	4 C°	1 x 1 L P	[ ]	
[ ] SULFATE / ALKALINITY	USEPA 374.5 / 310.1	4 C°	1 x 1 L P	[ ]	
[ ] NO_3 - NO_2	USEPA 353.2	H_2SO_4 to pH <2	1 X 500 mL P	[ ]	
[ ] TOC	USEPA 415.1	H_2SO_4 to pH <2	1 X 250 mL AG	[ ]	
[ ] MANGANESE - FIELD FILTERED	SW846 6010	HNO_3 to pH <2	1 X 500 mL P	[ ]	
[ ] METHANE / ETHANE / ETHYLENE	RSK 175	HCl / 4 C°	3 X 40 mL	[ ]	/ /
[ ] FERROUS IRON	FIELD METHOD	RESULT =			
[ ] HYDROGEN SULFIDE	FIELD METHOD	RESULT =			
[ ] DISSOLVED OXYGEN	FIELD METHOD - MODIFIED WINKLER	RESULT =			

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES NO

LOCATION NOTES

NOTES:

SIGNATURE _____

Checked By: _____ Date: _____

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: AMSA 68(G) Lincoln, RI | FIELD SAMPLE ID: RI23-GWSMW20D | JOB NUMBER: 361B048123.02
LOCATION ID: MW-20D | TRIP BLANK: TB-2 | EVENT NO: 2
ACTIVITY: START 1605 END 1708 | SAMPLE TIME: 1658 | DATE: 6/26/17

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: [X] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	6.97 feet	PROTECTIVE CASING STICKUP (FROM GROUND)	— feet	CASING / WELL DIFFERENCE	— feet
FINAL DEPTH TO WATER	7.39 feet	~~HISTORICAL~~ WELL DEPTH (TOR)	19.31 feet	WELL DIAMETER	1 inches
SCREEN LENGTH	10 feet	PRESSURE TO PUMP	— psi	PID AMBIENT AIR	2.0 ppmv
TOTAL VOL PURGED	1.94 gallons	REFILL SETTING	—	PID WELL MOUTH	1.2 ppmv
				DISCHARGE SETTING	—

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml (liter))

WELL INTEGRITY:

INTEGRITY	YES	NO	NA
CAP	X		
CASING			X
LOCKED		X	
COLLAR	X		

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (mL/min)	TEMP (°C)	SPECIFIC CONDUCTIVITY (mS/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (NTU)	REDOX (+/- mV)	PUMP INTAKE DEPTH (ft)	COMMENTS
1605	Begin	Purging								
1615	7.27	150	15.29	0.318	6.02	10.15	99.3	151		
1620	7.32	150	14.55	0.314	5.65	8.59	41.8	140		
1625	7.35	150	14.19	0.318	5.63	8.35	21.2	133		
1630	7.37	150	14.12	0.321	5.63	7.18	14.2	132		
1635	7.37	150	14.01	0.322	5.64	7.21	9.52	128		
1640	7.38	150	14.15	0.323	5.64	6.76	4.59	127		
1645	7.38	150	14.21	0.324	5.65	6.54	5.81	124		
1650	7.39	150	14.20	0.327	5.67	6.58	5.95	123		
1655	7.39	150	13.99	0.327	5.69	6.17	5.44	120		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP:
[ ] DEDICATED MARSCHALK BLADDER
[X] OTHER PERISTALTIC
[ ] NON-DEDICATED MARSCHALK BLADDER

TYPE OF TUBING:
[X] HIGH DENSITY POLYETHYLENE
[ ] OTHER _____

ANALYTICAL PARAMETERS

CONTROL NUMBER _____

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
[X] VOCs	8260B	HCl / 4 C°	3 X 40 mL	[X]	/ /
[ ] VOCs 5 mL Purge	8260B w/ MTBE and TICs	HCl / 4 C°	3 X 40 mL	[ ]	/ /
[ ] PESTICIDES (PESTICIDES ONLY)	8081	4 C°	2 X 1 L AG	[ ]	/
[ ] SULFATE / CHLORIDE / ALKALINITY	USEPA 374.5 / 325.2 / 310.1	4 C°	1 x 1 L P	[ ]	
[ ] SULFATE / ALKALINITY	USEPA 374.5 / 310.1	4 C°	1 x 1 L P	[ ]	
[ ] NO_3 - NO_2	USEPA 353.2	H_2SO_4 to pH <2	1 X 500 mL P	[ ]	
[ ] TOC	USEPA 415.1	H_2SO_4 to pH <2	3 X 250 mL AG	[ ]	
[ ] MANGANESE - FIELD FILTERED	SW846 6010	HNO_3 to pH <2	1 X 500 mL P	[ ]	
[ ] METHANE / ETHANE / ETHYLENE	RSK 175	HCl / 4 C°	3 X 40 mL	[ ]	/ /
[ ] FERROUS IRON	FIELD METHOD	RESULT = _____			
[ ] HYDROGEN SULFIDE	FIELD METHOD	RESULT = _____			
[ ] DISSOLVED OXYGEN	FIELD METHOD - MODIFIED WINKLER	RESULT = _____			

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED (YES) NO

NOTES: DUP/MS/MSD collected

SIGNATURE _____

Checked By: _____

LOCATION NOTES

MACTEC inc

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT	AMSA 68(G) Lincoln, RI	FIELD SAMPLE ID	[illegible]	JOB NUMBER	36180848123.02
LOCATION ID	MW-21	TRIP BLANK	TB 2	EVENT NO	02
ACTIVITY	START 1625 END 1710	SAMPLE TIME	1710	DATE	6 26 17

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT
- [x] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	5.34 feet	~~HISTORICAL~~ WELL DEPTH (TOR)	11.38 feet	PROTECTIVE CASING STICKUP (FROM GROUND)	— feet
FINAL DEPTH TO WATER	5.38 feet	PID AMBIENT AIR	0.0 ppmv	CASING / WELL DIFFERENCE	— feet
SCREEN LENGTH	10 feet	PRESSURE TO PUMP	— psi	PID WELL MOUTH	1.4 ppmv	WELL DIAMETER	1.0 inches
TOTAL VOL PURGED	0.83 gallons	REFILL SETTING	—	DISCHARGE SETTING	—		

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY:

INTEGRITY:	YES	NO	N/A
CAP	✓		
CASING			✓
LOCKED		✓	
COLLAR	✓		

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (mL/min)	TEMP (C°)	SPECIFIC CONDUCTIVITY (mS/cm)	pH (units)	DISS O2 (mg/L)	TURBIDITY (NTU)	REDOX (± 10 mV)	PUMP INTAKE DEPTH (ft)	COMMENTS
1625	Begin Purge		20.4							
1630	5.38	80	18.6	0.191	5.73	1.35	16.4	-26		
1635	5.38	80	18.6	0.213	5.60	0.79	15.2	-35		
1640	5.38	80	19.5	0.207	5.56	0.52	15.7	-37		
1645	5.38	80	18.7	0.219	5.52	0.36	10.5	-32		
1650	5.38	80	18.1	0.215	5.52	0.26	11.3	-34		
1655	5.38	80	18.5	0.204	5.54	0.32	4.85	-39		
1700	5.38	80	18.3	0.232	5.54	0.25	4.94	-36		
1705	5.38	80	18.4	0.227	5.54	0.24	4.73	-36		
1710	Sample Time									

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] DEDICATED MARSCHALK BLADDER
- [ ] NON-DEDICATED MARSCHALK BLADDER
- [x] OTHER PERISTALTIC

TYPE OF TUBING
- [x] HIGH DENSITY POLYETHYLENE
- [ ] OTHER _____

ANALYTICAL PARAMETERS

CONTROL NUMBER _____

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
[x] VOCs	8260B	HCl / 4 C°	3 X 40 mL	[x] 3	___/___/___
[ ] VOCs 5 mL Purge	8260B w / MTBE and TICs	HCl / 4 C°	3 X 40 mL	[ ]	___/___/___
[ ] PESTICIDES (PESTICIDES ONLY)	8081	4 C°	2 X 1 L AG	[ ]	___/___
[ ] SULFATE / CHLORIDE / ALKALINITY	USEPA 374.5 / 325.2 / 310.1	4 C°	1 x 1 L P	[ ]	___
[ ] SULFATE / ALKALINITY	USEPA 374.5 / 310.1	4 C°	1 x 1 L P	[ ]	___
[ ] NO_3 - NO_2	USEPA 353.2	H_2SO_4 to pH <2	1 X 500 mL P	[ ]	___
[ ] TOC	USEPA 415.1	H_2SO_4 to pH <2	1 X 250 mL AG	[ ]	___
[ ] MANGANESE - FIELD FILTERED	SW846 6010	HNO_3 to pH <2	1 X 500 mL P	[ ]	___
[ ] METHANE / ETHANE / ETHYLENE	RSK 175	HCl / 4 C°	3 X 40 mL	[ ]	___/___/___
[ ] FERROUS IRON	FIELD METHOD	RESULT = _____			
[ ] HYDROGEN SULFIDE	FIELD METHOD	RESULT = _____			
[ ] DISSOLVED OXYGEN	FIELD METHOD - MODIFIED WINKLER	RESULT = _____			

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED (YES) NO

LOCATION NOTES

NOTES:

SIGNATURE: _____

Checked By: _____ MACTEC Inc.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT	AMSA 68(G) Lincoln, RI	FIELD SAMPLE ID	[illegible]	JOB NUMBER	3618049123.02
LOCATION ID	MW-21D	TRIP BLANK	TB-2	EVENT NO	02
ACTIVITY	START 1720 END 1835	SAMPLE TIME	1825	DATE	6-26-07

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT
- [x] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	4.93 feet	PROTECTIVE CASING STICKUP (FROM GROUND)	— feet	CASING / WELL DIFFERENCE	— feet
FINAL DEPTH TO WATER	6.14 feet	~~HISTORICAL~~ WELL DEPTH (TOR)	14.39 feet	PID AMBIENT AIR	0.0 ppmv
SCREEN LENGTH	5 feet	PRESSURE TO PUMP	— psi	PID WELL MOUTH	1.2 ppmv
TOTAL VOL PURGED	~~4.43~~ 1.21 gallons	REFILL SETTING	—	DISCHARGE SETTING	—

WELL DIAMETER: 1.0 inches

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTEGRITY	YES	NO	N/A
CAP	✓		
CASING			✓
LOCKED		✓	
COLLAR	✓		

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (mL/min)	TEMP (C)	SPECIFIC CONDUCTIVITY (mS/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (NTU)	REDOX (+/- mV)	PUMP INTAKE DEPTH (ft)	COMMENTS
1720	Begin	Purging								
1725	6.29	90	15.9	0.358	6.21	0.66	16.6	-101		
1730	6.66	90	15.5	0.355	6.23	0.36	14.0	-106		
1735	6.55	75	17.2	0.355	6.24	0.17	7.42	-116		
1740	6.28	75	17.6	0.355	6.24	0.18	7.09	-115		
1745	6.23	75	17.9	0.359	6.24	0.22	6.30	-115		
1750	6.23	75	17.4	0.374	6.24	0.26	5.32	-115		
1755	6.26	75	17.3	0.377	6.24	0.18	4.61	-116		
1800	6.25	75	17.5	0.376	6.24	0.17	4.11	-117		
1805	6.31	75	17.2	0.351	6.24	0.21	4.95	-116		
1810	6.14	75	18.0	0.377	6.25	0.18	4.28	-118		
1815	6.14	75	17.8	0.381	6.25	0.19	4.21	-117		
1820	6.14	75	18.0	0.381	6.25	0.19	4.23	-118		
1825	Sample Time									

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] DEDICATED MARSCHALK BLADDER
- [ ] NON-DEDICATED MARSCHALK BLADDER
- [x] OTHER PERISTALTIC

TYPE OF TUBING
- [x] HIGH DENSITY POLYETHYLENE
- [ ] OTHER ______

ANALYTICAL PARAMETERS

CONTROL NUMBER ______

PARAMETER	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
[x] VOCs	8260B	HCl / 4 C°	3 X 40 mL	3	__/__/__
[ ] VOCs 5 mL Purge	8260B w / MTBE and TICs	HCl / 4 C°	3 X 40 mL		__/__/__
[ ] PESTICIDES (PESTICIDES ONLY)	8081	4 C°	2 X 1 L AG		__/__
[ ] SULFATE / CHLORIDE / ALKALINITY	USEPA 374.5 / 325.2 / 310.1	4 C°	1 x 1 L P		__
[ ] SULFATE / ALKALINITY	USEPA 374.5 / 310.1	4 C°	1 x 1 L P		__
[ ] NO_2 - NO_3	USEPA 353.2	H_2SO_4 to pH <2	1 X 500 mL P		__
[ ] TOC	USEPA 415.1	H_2SO_4 to pH <2	1 X 250 mL AG		__
[ ] MANGANESE - FIELD FILTERED	SW846 6010	HNO_3 to pH <2	1 X 500 mL P		__
[ ] METHANE / ETHANE / ETHYLENE	RSK 175	HCl / 4 C°	3 X 40 mL		__/__/__
[ ] FERROUS IRON	FIELD METHOD	RESULT = ______			
[ ] HYDROGEN SULFIDE	FIELD METHOD	RESULT = ______			
[ ] DISSOLVED OXYGEN	FIELD METHOD - MODIFIED WINKLER	RESULT = ______			

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED (YES) NO

LOCATION NOTES

NOTES:

SIGNATURE: [signature]

Checked By:

MACTEC, Inc.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT	AMSA 68(G) Lincoln, RI	FIELD SAMPLE ID	RI22-[illegible]	JOB NUMBER	3616048123.02
LOCATION ID	MW-22	TRIP BLANK	TB-3	EVENT NO	02
ACTIVITY	START 1745 END 1830	SAMPLE TIME	1830	DATE	6-27-07

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT
- [x] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	4.45 feet			PROTECTIVE CASING STICKUP (FROM GROUND)	— feet	CASING / WELL DIFFERENCE	— feet
FINAL DEPTH TO WATER	4.52 feet	~~HISTORICAL~~ WELL DEPTH (TOR)	11.65 feet	PID AMBIENT AIR	0.1 ppmv	WELL DIAMETER	1.0 inches
SCREEN LENGTH	10 feet	PRESSURE TO PUMP	— psi	PID WELL MOUTH	0.3 ppmv		
TOTAL VOL PURGED	1.04 gallons	REFILL SETTING	—	DISCHARGE SETTING	—		

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTERGRITY

INTEGRITY	YES	NO	N/A
CAP	✓		
CASING			✓
LOCKED		✓	
COLLAR	✓	~~✓~~	

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (mL/min)	TEMP (C°)	SPECIFIC CONDUCTIVITY (mS/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (NTU)	REDOX (+/- mV)	PUMP INTAKE DEPTH (ft)	COMMENTS
1750	Begin Purging									
1755	4.51	100	16.9	0.240	6.05	0.51	708	-71		
1800	4.52	100	16.3	0.239	6.01	0.29	664	-70		
1805	4.51	120	16.4	0.230	6.02	0.58	434	-71		
1810	4.52	120	16.6	0.226	6.03	0.45	270	-73		
1815	4.52	120	16.5	0.225	6.02	0.39	156	-73		
1820	4.52	120	16.0	0.223	6.02	0.39	150	-74		
1825	4.52	120	15.8	0.221	6.04	0.33	141	-76		
1830	Sample Time									

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] DEDICATED MARSCHALK BLADDER
- [ ] NON-DEDICATED MARSCHALK BLADDER
- [x] OTHER _ PERISTALTIC

TYPE OF TUBING
- [x] HIGH DENSITY POLYETHYLENE
- [ ] OTHER ______

ANALYTICAL PARAMETERS

CONTROL NUMBER ______

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
[x] VOCs	8260B	HCl / 4 C°	3 X 40 mL	3	__/__/__
[ ] VOCs 5 mL Purge	8260B w/ MTBE and TICs	HCl / 4 C°	3 X 40 mL		__/__/__
[ ] PESTICIDES (PESTICIDES ONLY)	8081	4 C°	2 X 1 L AG		__/__
[ ] SULFATE / CHLORIDE / ALKALINITY	USEPA 374.5 / 325.2 / 310.1	4 C°	1 x 1 L P		__
[ ] SULFATE / ALKALINITY	USEPA 374.5 / 310.1	4 C°	1 x 1 L P		__
[ ] NO_3 - NO_2	USEPA 353.2	H_2SO_4 to pH <2	1 X 500 mL P		__
[ ] TOC	USEPA 415.1	H_2SO_4 to pH <2	1 X 250 mL AG		__
[ ] MANGANESE - FIELD FILTERED	SW846 6010	HNO_3 to pH <2	1 X 500 mL P		__
[ ] METHANE / ETHANE / ETHYLENE	RSK 175	HCl / 4 C°	3 X 40 mL		__/__/__
[ ] FERROUS IRON	FIELD METHOD	RESULT = ______			
[ ] HYDROGEN SULFIDE	FIELD METHOD	RESULT = ______			
[ ] DISSOLVED OXYGEN	FIELD METHOD - MOD FIELD WINKLER	RESULT = ______			

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED (YES) NO

LOCATION NOTES

~~Bolt on cap broken~~ AZ 6-27-07

NOTES:

SIGNATURE [signature]

Checked By:

MACTEC, Inc.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: AMSA 68(G) Lincoln, RI | FIELD SAMPLE ID: RI27-GWSMW22D07 | JOB NUMBER: 361B048123.02

LOCATION ID: MW-22D | TRIP BLANK: TB-3 | EVENT NO: 2

ACTIVITY: START 1733 END 1824 | SAMPLE TIME: 1807 | DATE: 6/27/07

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: [X] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	4.50 feet	PROTECTIVE CASING STICKUP (FROM GROUND)	— feet	CASING / WELL DIFFERENCE	— feet
FINAL DEPTH TO WATER	4.60 feet	~~HISTORICAL~~ WELL DEPTH (TOR)	16.47 feet	WELL DIAMETER	1 inches
SCREEN LENGTH	5 feet	PRESSURE TO PUMP	— psi	FID AMBIENT AIR	0.0 ppmv
TOTAL VOL PURGED	1.44 gallons	REFILL SETTING	—	PID WELL MOUTH	0.7 ppmv
				DISCHARGE SETTING	—

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTEGRITY

INTEGRITY	YES	NO	N/A
CAP	X	—	—
CASING	—	—	X
LOCKED	—	X	—
COLLAR	X	—	—

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (mL/min)	TEMP (C°)	SPECIFIC CONDUCTIVITY (mS/cm)	pH (units)	DISS O2 (mg/L)	TURBIDITY (NTU)	REDOX (+/- mV)	PUMP INTAKE DEPTH (ft)	COMMENTS
1733	Begin Purging									
1735	4.58	170	16.48	0.251	6.42	7.69	13.1	-17		
1740	4.58	170	15.63	0.222	6.03	0.00	11.0	9		
1745	4.59	170	15.50	0.218	5.82	0.00	7.04	24		
1750	4.60	170	15.54	0.213	5.79	0.00	5.68	30		
1755	4.60	170	15.25	0.209	5.75	0.00	5.28	36		
1800	4.60	170	15.38	0.210	5.71	0.00	5.05	39		
1805	4.60	170	15.78	0.211	5.70	0.00	4.99	41		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] DEDICATED MARSCHALK BLADDER
- [ ] NON-DEDICATED MARSCHALK BLADDER
- [X] OTHER PERISTALTIC

TYPE OF TUBING
- [X] HIGH DENSITY POLYETHYLENE
- [ ] OTHER _____

ANALYTICAL PARAMETERS

CONTROL NUMBER _____

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
[X] VOCs	8260B	HCl / 4 C°	3 X 40 mL	[X]	___/___/___
[ ] VOCs 5 mL Purge	8260B w / MTBE and TICs	HCl / 4 C°	3 X 40 mL	[ ]	___/___/___
[ ] PESTICIDES (PESTICIDES ONLY)	8081	4 C°	2 X 1 L AG	[ ]	___/___
[ ] SULFATE / CHLORIDE / ALKALINITY	USEPA 374.5 / 325.2 / 310.1	4 C°	1 x 1 L P	[ ]	
[ ] SULFATE / ALKALINITY	USEPA 374.5 / 310.1	4 C°	1 x 1 L P	[ ]	___
[ ] NO_2 / NO_3	USEPA 353.2	H_2SO_4 to pH <2	1 X 500 mL P	[ ]	___
[ ] TOC	USEPA 415.1	H_2SO_4 to pH <2	1 X 250 mL AG	[ ]	___
[ ] MANGANESE - FIELD FILTERED	SW846 6010	HNO_3 to pH <2	1 X 500 mL P	[ ]	___
[ ] METHANE / ETHANE / ETHYLENE	RSK 175	HCl / 4 C°	3 X 40 mL	[ ]	___/___/___
[ ] FERROUS IRON	FIELD METHOD	RESULT =			
[ ] HYDROGEN SULFIDE	FIELD METHOD	RESULT =			
[ ] DISSOLVED OXYGEN	FIELD METHOD - MODIFIED WINKLER	RESULT =			

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: (YES) NO

LOCATION NOTES

NOTES:

SIGNATURE

Checked By: _____

MACTEC, Inc.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: AMSA 68(G) Lincoln, RI | FIELD SAMPLE ID: RI23 GW SMW-24D 0 | JOB NUMBER: 3618048123.02
LOCATION ID: MW-24D | TRIP BLANK: TB 2 | EVENT NO: 02
ACTIVITY: START 1535 (NO) | SAMPLE TIME: 1740 | DATE: 6/26/07 6/27/07

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT: [✓] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING

INITIAL DEPTH TO WATER	~~5.91~~ feet	PROTECTIVE CASING STICKUP (FROM GROUND)	— feet	CASING / WELL DIFFERENCE	— feet
FINAL DEPTH TO WATER	9.78 feet	~~LIG FORTION~~ WELL DEPTH (TOR)	14.31 feet	WELL DIAMETER	1.0 inches
SCREEN LENGTH	5 feet	PRESSURE TO PUMP	— psi	PID AMBIENT AIR	0.0 ppmv
TOTAL VOL PURGED	0.92 gallons	REFILL SETTING	—	PID WELL MOUTH	1.4 ppmv
				DISCHARGE SETTING	—

(purge volume (ml/ liters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

WELL INTEGRITY

INTEGRITY	YES	NO	N/A
CAP	✓		
CASING			✓
LOCKED		✓	
COLLAR	✓		

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (mL/min)	TEMP (C°)	SPECIFIC CONDUCTIVITY (mS/cm)	pH (units)	DISS O2 (mg/L)	TURBIDITY (NTU)	REDOX (+/- mV)	PUMP INTAKE DEPTH (ft)	COMMENTS
1535	Begin	Purging								
1540	9.41	100	15.5	0.445	6.54	1.83	26.3	-172		
1545	9.35	100	15.4	0.419	6.47	0.56	29.0	-166		
1550	9.37	100	15.2	0.419	6.45	0.46	16.3	-166		
1555	10:11.18	100	14.9	0.413	6.43	0.37	95.3	-165		
1600	11.53	100	14.6	0.420	6.44	0.49	93.4	-152		
1605	11.91	100	14.8	0.425	6.44	1.15	71.4	-147		Turned pump up to purge dry
1610	Well Purged Dry									
1730	6.14	Begin Purging								
1735	9.78	100	14.8	0.403	6.50	1.09	48.4	-143		
1740	Sample Time									

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
[ ] DEDICATED MARSCHALK BLADDER
[ ] NON-DEDICATED MARSCHALK BLADDER
[✓] OTHER PERISTALTIC

TYPE OF TUBING
[✓] HIGH DENSITY POLYETHYLENE
[ ] OTHER _____

ANALYTICAL PARAMETERS

CONTROL NUMBER _____

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID LETTERS
[✓] VOCs	8260B	HCl / 4 C°	3 X 40 mL	[3]	___/___/___
[ ] VOCs 5 mL Purge	8260B w/ MTBE and TICs	HCl / 4 C°	3 X 40 mL	[ ]	___/___/___
[ ] PESTICIDES (PESTICIDES ONLY)	8081	4 C°	2 X 1 L AG	[ ]	___/___
[ ] SULFATE / CHLORIDE / ALKALINITY	USEPA 374.5 / 325.2 / 310.1	4 C°	1 x 1 L P	[ ]	___
[ ] SULFATE / ALKALINITY	USEPA 374.5 / 310.1	4 C°	1 x 1 L P	[ ]	___
[ ] NO_2 - NO_3	USEPA 353.2	H_2SO_4 to pH <2	1 X 500 mL P	[ ]	___
[ ] TOC	USEPA 415.1	H_2SO_4 to pH <2	1 X 250 mL AG	[ ]	___
[ ] MANGANESE - FIELD FILTERED	SW846 6010	HNO_3 to pH <2	1 X 500 mL P	[ ]	___
[ ] METHANE / ETHANE / ETHYLENE	RSK 175	HCl / 4 C°	3 X 40 mL	[ ]	___/___/___
[ ] FERROUS IRON	FIELD METHOD	RESULT = _____			
[ ] HYDROGEN SULFIDE	FIELD METHOD	RESULT = _____			
[ ] DISSOLVED OXYGEN	FIELD METHOD - MODIFIED WINKLER	RESULT = _____			

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED (YES) NO

NOTES:

SIGNATURE: _____

Checked By: _____

LOCATION NOTES

APPENDIX G

DATA VALIDATION SUMMARIES

APPENDIX G-1

DATA VALIDATION SUMMARY
2006 ANALYSES

Data Validation Summary
JANUARY 2006 SAMPLING EVENT
KEMRON USARC GFPR
Lincoln, Rhode Island

1.0 INTRODUCTION

Thirty-seven soil samples and thirty-six aqueous samples were collected from January 17th through January 31st, 2006 at the Kemron USARC GFPR sites in Lincoln, Rhode Island. Sites include the Potential Past Disposal Areas (#122), Former Gas UST (#123), and Septic Systems (#124). Soil and water samples were collected for analyses determined for each location based on historical use and potential contamination. Soil samples were analyzed for one or more of the following parameters:

- Volatile organic compounds (VOC) by Method 8260B
- Semivolatile organic compounds (SVOC) by Method 8270C
- Volatile petroleum hydrocarbons (VPH) using Massachusetts Department of Environmental Protection (MADEP) methods
- Extractable petroleum hydrocarbons (EPH) using MADEP methods
- Pesticides (PEST) using Method 8081A
- Total metals by Methods 6010B, 6020, and 7471A
- Lead using synthetic precipitation leaching procedure (SPLP) Method 1312

Aqueous samples were analyzed for one or more of the following parameters:

- VOCs by Method 8260B
- Low concentration Method 8011 for 1,2-dibromoethane (EDB) and 1,2-Dibromo-3-chloropropane (DBCP)
- Polyaromatic Hydrocarbons (PAH) Modified 8270C for Low Concentration Benzo(a)pyrene (Site #124 only)
- SVOCs by Method 8270C
- PEST by Method 8081A
- Total and dissolved lead by Method 6020

All analyses except EPH and VPH were performed by Kemron Environmental Services of Marietta, Ohio. Analyses for EPH and VPH were performed by Accutest Laboratories of Marlborough, Massachusetts.

A Tier II validation was completed for all samples. For twenty percent of samples a Tier III data validation was performed for VOC, SVOC, PAH, PEST, and metals analyses. A chemist review was performed on the EPH and VPH analyses. The data package was validated using Region I EPA-New England Data Validation Functional Guidelines for Evaluating Environmental Analyses (USEPA, 1996), Region I Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses (USEPA, 1988), Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (USEPA, 1989) and the Kemron USARC Massachusetts GFPR Quality Assurance Project Plan (Kemron, 2005).

The following samples and sample delivery groups (SDGs) are included in this data evaluation:

Field Sample ID	Kemron SDG	Accutest SDG	Sample Date	Comment
RI24-SBS0102	L0601350	M54062	1/17/06	
RI24-SBS0202	L0601350	M54062	1/17/06	
RI24-SBS0302	L0601350	M54062	1/17/06	
RI24-SBS0403	L0601350	M54062	1/17/06	
RI24-SBS0503	L0601350	M54062	1/17/06	
RI24-SBS0602	L0601350	M54062	1/17/06	
RI24-SBS0702	L0601350	M54062	1/17/06	
RI22-SBS0202	L0601350	M54062	1/18/06	
RI22-SBS0301	L0601350	M54062	1/18/06	
RI22-SBS0502	L0601350	M54062	1/18/06	
RI22-GWS0201	L0601350	--	1/18/06	
RI22-GWS0301	L0601350	--	1/18/06	
RI22-GWS0501	L0601411	--	1/19/06	
RI22-GWS0101	L0601411	--	1/19/06	
RI22-GWS0401	L0601411	--	1/19/06	
RI22-GWS0601	L0601411	--	1/19/06	
RI22-GWS0701	L0601411	--	1/19/06	
RI22-GWS0801	L0601411	--	1/19/06	
RI22-GWS0801	L0601411	--	1/20/06	
RI23-GWS0101	L0601411	--	1/20/06	
RI23-GWS0201	L0601411	--	1/20/06	
RI23-GWS0301	L0601411	--	1/20/06	
RI23-GWS0401	L0601411	--	1/20/06	
RI22-SBS0102	L0601412	M54130	1/19/06	
RI22-SBS0402	L0601412	M54130	1/19/06	
RI22-SBD0402	L0601412	M54130	1/19/06	Duplicate
RI22-SBS0603	L0601412	M54130	1/19/06	
RI22-SBS0601	L0601412	M54130	1/19/06	
RI22-SBS0702	L0601412	M54130	1/19/06	
RI22-SBS0802	L0601412	M54130	1/19/06	
RI23-SBS0102	L0601412	M54130	1/20/06	
RI23-SBS0202	L0601412	M54130	1/20/06	
RI23-SBS0302	L0601412	M54130	1/20/06	
RI23-SBS0402	L0601412	M54130	1/20/06	
RI23-SBS0502	L0601485	M54181	1/23/04	
RI23-SBS0702	L0601485	M54181	1/23/04	
RI23-SBS0802	L0601485	M54181	1/23/04	
RI23-SBD0802	L0601485	M54181	1/23/04	Duplicate
RI23-SBMS0802	L0601485	M54181	1/23/04	Matrix Spike
RI23-SBMSD0802	L0601485	M54181	1/23/04	Matrix Spike Duplicate
RI23-SBS0704	L0601485	M54181	1/23/04	
RI23-SBS0803	L0601485	M54181	1/24/04	
RI23-SBS1002	L0601485	M54181	1/24/04	
Field Sample ID	**Kemron SDG**	**Accutest SDG**	**Sample Date**	**Comment**

RI23-SBS1012	L0601485	M54181	1/24/04	
RI23-SBS1102	L0601485	M54181	1/24/04	
RI23-SBS0902	L0601485	M54181	1/24/04	
RI23-GWS0501	L0601485	--	1/23/04	
RI23-GWS0701	L0601485	--	1/23/04	
RI23-GWS0801	L0601485	--	1/24/04	
RI23-GWD0801	L0601485	--	1/24/04	Duplicate
RI23-GWS1001	L0601485	--	1/24/04	
RI23-GWS1101	L0601485	--	1/24/04	
RI23-GWS0601	L0601534	--	1/25/06	
RI22-GWS0901	L0601534	--	1/26/06	
RI22-GWS1001	L0601534	--	1/26/06	
RI23-GWS0901	L0601534	--	1/26/06	
RI23-GWD0901	L0601534	--	1/26/06	Duplicate
RI23-GWMS0901	L0601534	--	1/26/06	Matrix Spike
RI23-GWMSD0901	L0601534	--	1/26/06	Matrix Spike Duplicate
RI24-GWSEW101	L0601534	--	1/26/06	
RI24-GWSMW301	L0601534	--	1/26/06	
RI24-GWSMW6S01	L0601534	--	1/27/06	
RI22-GWSMW101	L0601534	--	1/27/06	
RI22-SBS0711	L0601534	M54261	1/25/06	
RI23-SBS0602	L0601534	M54261	1/25/06	
RI23-SBS0902	L0601534	M54261	1/25/06	
RI23-SBS0907	L0601534	M54261	1/25/06	
RI23-SBD0907	L0601534	M54261	1/25/06	Duplicate
RI22-SBS1002	L0601534	M54261	1/25/06	
RI22-GWSMW1401	L0602041	--	1/30/06	
RI23-GWSMW1601	L0602041	--	1/30/06	
RI23-GWDMW1601	L0602041	--	1/30/06	Duplicate
RI22-GWSMW801	L0602041	--	1/30/06	
RI22-GWSMW1501	L0602041	--	1/30/06	
RI22-GWSMW201	L0602041	--	1/30/06	
RI23-GWSMW1701	L0602041	--	1/30/06	
RI23-GWSMW1801	L0602041	--	1/31/06	
RI24-GWSPIT1	L0602041	--	1/31/06	

- Accutest STDs only listed for samples with VPH or EPH samples

Data qualifications were completed when necessary in accordance with the guidelines using the following qualifiers:

U = The target compound was not detected at concentrations greater than the associated quantitation limit;

J = The reported concentration is considered an estimated value;

R = Result is rejected and considered unusable.

With the exception of the items discussed below, QC parameters and measurements checked during validation met requirements in the analytical method, validation guidelines, and quality assurance (QA) plan goals. Unless specified below, results are usable without qualification.

2.0 VOLATILE ORGANIC COMPOUNDS ANALYSIS (8260B)

Data were evaluated for the following parameters:

* Data Completeness
* Preservation and Technical Holding Times
* Instrument Tuning
  Initial and Continuing Calibration
  Blank Contamination
  Surrogate Spike Compounds
  Matrix Spike/Matrix Spike Duplicate (MS/MSD)
  Laboratory Control Sample (LCS)
* Field Duplicate
  Internal Standards
* Target Compound Quantitation
* Electronic Evaluation Verification

  * = criteria were met for this parameter

With the exception of the following items discussed below, results are determined to be usable as reported by the laboratory. Data qualifications and interpretations are presented by SDG.

Initial and Continuing Calibration

The data validation guidelines establish minimum response guidelines for target compounds in calibration standard runs. For a subset of VOCs including the ketones (acetone, 4-methyl-2-pentanone, and 2-butanone), acrylonitrile, and 1,2-dibromo-3-chloropropane the response was less than the minimum response in the guidelines. Positive results were qualified estimated (J) and non-detects were qualified rejected (R) based on the guidelines. Specific details are summarized below for each SDG.

L0601411 – The initial calibration associated with all samples in SDG L0601411 had an average relative response factor (RRF) less than the QC limit of 0.05 for acetone (0.039). Acetone detections in all samples were qualified as estimated (J).

The continuing calibration associated with samples RI22-GWS0101, RI22-GWS0401, RI22-GWS0501, RI22-GWS0601, RI22-GWS0701 and RI22-GWS0801 had a percent difference greater than the QC limit of 25 for 1,1,1-trichloroethane (29.6) and 2,2-dichloropropane (36.8). 1,1,1-Trichloroethane and 2,2-dichloropropane were reported as non-detect (U) in samples RI22-GWS0101, RI22-GWS0401, RI22-GWS0501, RI22-GWS0601, RI22-GWS0701 and RI22-GWS0801 and were qualified as estimated (UJ).

L0602041 – The initial calibration associated with all samples in SDG L0602041 had RRFs less than the QC limit of 0.05 for acetone (0.036), acrylonitrile (0.046) and 4-methyl-2-pentanone (0.044). The

continuing calibration associated with all samples in SDG L0602041 had RRFs less than the QC limit of 0.05 for acetone (0.038), acrylonitrile (0.046) and 4-methyl-2-pentanone (0.043). Acrylonitrile and 4-methyl-2-pentanone were reported as non-detect (U) in all associated samples and were qualified as rejected (R). Acetone was reported as non-detect (U) in samples RI23-GWSMW1601, RI23-GWDMW1601 and RI23-GWSMW1801 and was qualified as rejected (R). Acetone detections in samples RI22-GWSMW1401, RI22-GWSMW1801, RI22-GWSMW1501, RI22-GWSMW201, RI23-GWSMW1701 and RI24-GWSPIT1 were qualified as estimated (J).

L0601412 – The initial calibration associated with samples RI22-SBS0102, RI22-SBS0402, RI22-SBD0402 and RI22-SBS0802 had RRFs less than the QC limit of 0.05 for acetone (0.031), 2-butanone (0.045) and 4-methyl-2-pentanone (0.049). Acetone, 2-butanone and 4-methyl-2-pentanone were reported as non-detect (U) in samples RI22-SBS0102, RI22-SBS0402, RI22-SBD0402 and RI22-SBS0802 and were qualified as rejected (R).

The continuing calibration associated with samples RI22-SBS0102, RI22-SBS0402 and R122-SBD0402 had RRFs less than the QC limit of 0.05 for acetone (0.035) and 2-butanone (0.049). Acetone and 2-butanone were reported as non-detect (U) in samples RI22-SBS0102, RI22-SBS0402 and RI22-SBD0402 and were qualified as rejected (R).

The continuing calibration associated with sample RI22-SBS0802 had RRFs less than the QC limit of 0.05 for acetone (0.036) and 1,2-dibromo-3-chloropropane and percent differences greater than the QC limit of 25 for 1,2-dibromo-3-chloropropane (27.5), naphthalene (53.2), 1,2,3-trichlorobenzene (52.3) and 1,2,4-trichlorobenzene (27.7). Acetone and 1,2-dibromo-3-chloropropane were reported as non-detect (U) in sample RI22-SBS0802 and were qualified as rejected (R). The naphthalene detection in sample RI22-SBS0802 was qualified as estimated (J). 1,2,3-Trichlorobenzene and 1,2,4-trichlorobenzene were reported as non-detect (U) in sample RI22-SBS0802 and were qualified as estimated (UJ).

The continuing calibration associated with samples RI22-SBS0601, RI23-SBS0102, RI23-SBS0202, RI23-SBS0302 and RI23-SBS0402 had percent differences greater than the QC limit of 25 for 1,1,2,2-tetrachloroethane (25.3), 2-butanone (33.6), 1,2-dibromoethane (27.3), dichlorodifluoromethane (25.9), 2-hexanone (31.5), 4-methyl-2-pentanone (25.2) and 1,2,3-trichloropropane (29.3). Results for 1,1,2,2-tetrachloroethane, 2-butanone, 1,2-dibromoethane, dichlorodifluoromethane, 2-hexanone, 4-methyl-2-pentanone and 1,2,3-trichloropropane in samples RI22-SBS0601, RI23-SBS0102, RI23-SBS0202, RI23-SBS0302 and RI23-SBS0402 were qualified as estimated (J/UJ).

L0601534 – The initial calibration associated with samples RI22-SBS0711, RI23-SBS0907, RI23-SBD0907 and RI22-SBS1002 had RRFs less than the QC limit of 0.05 for acetone (0.036), acrylonitrile (0.046) and 4-methyl-2-pentanone (0.045). Acetone, acrylonitrile and 4-methyl-2-pentanone were reported as non-detect (U) in samples RI22-SBS0711, RI23-SBS0907, RI23-SBD0907 and RI22-SBS1002 and were qualified as rejected (R).

The initial calibration associated with samples RI23-GWS0601, RI22-GWS0901, RI22-GWS1001, RI23-GWS0901, RI23-GWD0901, RI24-GWSEW101, RI24-GWSMW301, RI24-GWSMW6S01 and RI22-GWSMW101 had RRFs less than the QC limit of 0.05 for acetone (0.031), 2-butanone (0.045) and 4-methyl-2-pentanone (0.049). 4-Methyl-2-pentanone was reported as non-detect (U) in samples RI23-GWS0601, RI22-GWS0901, RI22-GWS1001, RI23-GWS0901, RI23-GWD0901, RI24-GWSEW101, RI24-GWSMW301, RI24-GWSMW6S01 and RI22-GWSMW101 and was qualified as rejected (R). 2-Butanone was reported as non-detect (U) in samples RI23-GWS0601, RI22-GWS0901, RI23-GWS0901,

RI23-GWD0901, RI24-GWSEW101, RI24-GWSMW301, RI24-GWSMW6S01 and RI22-GWSMW101 and was qualified as rejected (R). Acetone was reported as non-detect (U) in samples RI23-GWS0901, RI23-GWD0901, RI24-GWSEW101, RI24-GWSMW301, RI24-GWSMW6S01 and RI22-GWSMW101 and was qualified as rejected (R). The detections of 2-butanone and acetone in sample RI22-GWS1001 were qualified as estimated (J). The detection of acetone in samples RI23-GWS0601 and RI22-GWS0901 were qualified as estimated (J).

The continuing calibration associated with samples RI22-SBS0711, RI23-SBS0907, RI23-SBD0907 and RI22-SBS1002 had RRFs less than the QC limit of 0.05 for acetone (0.037), acrylonitrile (0.047) and 4-methyl-2-pentanone (0.044). Acetone, acrylonitrile and 4-methyl-2-pentanone were reported as non-detect (U) in samples RI22-SBS0711, RI23-SBS0907, RI23-SBD0907 and RI22-SBS1002 and were qualified as rejected (R).

The continuing calibration associated with samples RI23-GWS0601, RI22-GWS0901, RI22-GWS1001, RI23-GWS0901, RI24-GWSMW301, RI24-GWSMW6S01 and RI22-GWSMW101 had RRFs less than the QC limit of 0.05 for acetone (0.037) and 2-butanone (0.048). Acetone was reported as non-detect (U) in samples RI23-GWS0901, RI24-GWSMW301, RI24-GWSMW6S01 and RI22-GWSMW101 and was qualified as rejected (R). 2-Butanone was reported as non-detect (U) in samples RI23-GWS0601, RI22-GWS0901, RI23-GWS0901, RI24-GWSMW301, RI24-GWSMW6S01 and RI22-GWSMW101 and was qualified as rejected (R). Acetone detections in samples RI23-GWS0601, RI22-GWS0901 and RI22-GWS1001 were qualified as estimated (J). The 2-butanone detection in sample RI22-GWS1001 was qualified as estimated (J).

The continuing calibration associated with samples RI23-GWD0901 and RI24-GWSEW101 had RRFs less than the QC limit of 0.05 for acetone (0.032), 2-butanone (0.046) and 4-methyl-2-pentanone (0.049) and a percent difference greater than 25 for 2,2-dichloropropane (30.3). Acetone, 2-butanone and 4-methyl-2-pentanone were reported as non-detect (U) and were qualified as rejected (R). 2,2-Dichloropropane was reported as non-detect (U) in samples RI23-GWD0901 and RI24-GWSEW101 and was qualified as estimated (UJ).

L0601485 - The initial calibration associated with samples RI22-SBS0902 and RI23-SBS1012 had RRFs less than the QC limit of 0.05 for acetone (0.035), acrylonitrile (0.046) and 4-methyl-2-pentanone (0.043). Acetone, acrylonitrile and 4-methyl-2-pentanone were reported as non-detect (U) in samples RI22-SBS0902 and RI23-SBS1012 and were qualified as rejected (R).

The initial calibration associated with samples RI23-GWS0501, RI23-GWS0701, RI23-GWS0801, RI23-GWS1001, RI23-GWD0801, and RI23-GWS1101 had RRFs less than the QC limit of 0.05 for acetone (0.031)), 2-butanone (0.045) and 4-methyl-2-pentanone (0.049). 2-butanone and 4-methyl-2-pentanone were reported as non-detect (U) in all samples and were qualified as rejected (R). Acetone was also reported as non-detect (U) in samples RI23-GWS0501 and RI23-GWD0801 and were qualified as rejected (R). Samples RI23-GWS0701, RI23-GWS0801, RI23-GWS1001, and RI23-GWS1101 had positive results for acetone and were qualified as estimated (J).

The continuing calibration associated with sample RI23-GWS1001 had RRFs less than the QC limit of 0.05 for acetone (0.035) and 2-butanone (0.048). The result for 2-butanone in sample RI23-GWS1001was non-detect (U) and was qualified as rejected (R). The result for acetone was positive in sample RI23-GWS1001 and was qualified as estimated (J).

The continuing calibration associated with samples RI23-GWS0501, RI23-GWS0701, RI23-GWS0801, RI23-GWD0801, and RI23-GWS1101 had RRFs less than the QC limit of 0.05 for acetone (0.034), 2-butanone (0.046), and 4-methyl-2-pentanone (0.049). The results for 2-butanone and 4-methyl-2-pentanone were non-detect (U) and were qualified as rejected (R). The results for acetone in samples RI23-GWS0701 and RI23-GWS0801, and RI23-GWS1101 were positive and were qualified as estimated (J). The results for acetone in samples RI23-GWS0501 and RI23-GWD0801 were non-detect (U) and were qualified as rejected (R).

The continuing calibration associated with samples RI23-SBS1012 and RI22-SBS0902 had RRFs less than the QC limit of 0.05 for acetone (0.037) and acrylonitrile (0.047). Acetone and acrylonitrile were reported as non-detect (U) in samples RI23-SBS1012 and RI22-SBS0902 and were qualified as rejected (R).

L0601350 - The initial calibration associated with samples RI22-GWS0301 and RI22-GWS0201 had RRFs less than the QC limit of 0.05 for acetone (0.039). Results for acetone were reported as non-detect (U) in both samples and were qualified as reject (R).

The continuing calibration associated with sample RI22-GWS0201 had an RRF which was less than the QC limit of 0.005 for acetone (0.047). The result for acetone in sample RI22-GWS0201 was non-detect and qualified as rejected (R). In addition, the percent differences for 2,2-dichloropropane (-36.8) and 1,1,1-trichloroethane (-29.6) were greater than the QC limit of 25. Results for 2,2-dichloropropane and 1,1,1-trichloroethane were both non-detect in sample RI22-GWS0201 and were qualified as estimated (UJ).

Blank Evaluations

L0601411 – The target compounds 1,4-dioxane, hexachlorobutadiene, methylene chloride, naphthalene and 1,2,3-trichlorobenzene were observed in the method blanks associated with the samples in SDG L0601411. No detections of 1,4-dioxane, hexachlorobutadiene, methylene chloride, or 1,2,3-trichlorobenzene were reported by the laboratory. The naphthalene detection in sample RI22-GWS0401 was below the validation action level and was qualified as non-detect (U) at the reporting limit.

L0601412 – Blank contamination was observed in the method blank associated with sample RI22-SBS0603 for p-isopropyltoluene. An action level was established at five times the concentration reported in the blank. The p-isopropyltoluene detection in sample RI22-SBS0603 was below the action level and was qualified as non-detect (U) at the reporting limit.

L0601485 - Blank contamination was observed in the method blank associated with samples RI23-SBS0502, RI23-SBS0702, RI23-SBS0802, RI23-SBD0802, RI23-SBS0704, RI23-SBS0803, RI23-SBS1002, RI23-SBS1102 for naphthalene. An action level was established at five times the concentration reported in the blank. Samples RI23-SBS0502 and RI23-SBS0704 had detections for naphthalene that were less than the action limit and were qualified as non-detect (U).

Surrogates

L0601412 – Surrogate percent recoveries were greater than the QC limits (70-130%) for one or more surrogates in samples RI22-SBS0603, RI22-SBS0702 and RI22-SBS0601. All detections in samples RI22-SBS0603, RI22-SBS0702 and RI22-SBS0601 were qualified as estimated (J) and may be biased high..

L0601534 – The percent recovery was greater than the QC limits (70-130%) for surrogate p-bromofluorobenzene (167 %) in sample RI22-SBS1002. All detections in sample RI22-SBS1002 were qualified as estimated (J) and may be biased high.

L0601485 - The percent recovery was greater than the QC limits (70-130%) for surrogate p-bromofluorobenzene (133 %) in sample RI23-GWS1001. The percent recovery for p-bromofluorobenzene (150 %) in sample RI22-SBS0902 was also greater than QC limits. Detections in sample RI23-GWS1001 and RI22-SBS0902 were qualified as estimated (J) and may be biased high.

L0601350 - The percent recovery was greater than the QC limits (70-130%) in sample RI24-SBS0602 for surrogates 1,2-dichloroethane (194 %) and dibromofluoromethane (154 %). In samples RI22-SBS0301 and RI22-SBS0502 DL01 the surrogate p-bromofluorobenzene (175 and 201 %) was greater than the QC limits. The percent recoveries for p-bromofluorobenzene (247 %) and toluene-d8 (148 %) in sample RI22-SBS0502 were also greater than QC limits. Positive detections in samples RI24-SBS0602, RI22-SBS0301, RI22-SBS0502, and RI22-SBS0502 DL01 were qualified as estimated (J) and may be biased high.

Matrix Spike/Matrix Spike Duplicate

L0601534 – The MS/MSD associated with sample RI23-GWS0901 and its field duplicate RI23-GWD0901 had percent recoveries outside the QC limits (70-130%) for n-butylbenzene (147 %), 1,4-dioxane (35 and 168 %), tert-butyl alcohol (48 %), tetrahydrofuran (67 and 69 %), 1,2,4-trimethylbenzene (235 and 41 %) and 1,3,5-trimethylbenzene (159 %), and relative percent differences (RPDs) greater than 30 for 1,4-dioxane (131), tert-butyl alcohol (69), 1,2,4-trimethylbenzene (44) and 1,3,5-trimethylbenzene (30). The detections of n-butylbenzene, 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene in samples RI23-GWS0901 and RI23-GWD0901 were qualified as estimated (J). 1,4-Dioxane, tert-butyl alcohol and tetrahydrofuran were reported as non-detect (U) in samples RI23-GWS0901 and RI23-GWD0901 and were qualified as estimated (UJ).

L0601485 - The MS/MSD associated with sample RI23-GWS1001 had percent recoveries outside the QC limits (70-130%) for hexachlorobutadiene (56 %), 1,2,3-trichlorobenzene (64 %), and 1,2,4-trichlorobenzene (61 %). Sample results for hexachlorobutadiene, 1,2,3-trichlorobenzene, and 1,2,4-trichlorobenzene were non-detect (U) and were qualified as estimated (UJ).

Laboratory Control Sample

L0602041 – The laboratory control sample (LCS) associated with all samples in SDG L0602041 had percent recoveries below the QC limits (70-130%) for 1,4-dioxane (61 %) and tert-butyl alcohol (69 %). 1,4-Dioxane and tert-butyl alcohol were reported as non-detect (U) in all samples and were qualified as estimated (UJ).

L0601412 – The LCS associated with samples RI22-SBS0102, RI22-SBS0402 and RI22-SBD0402 had percent recoveries below the QC limits (70-130%) for chloromethane (63 %), dichlorodifluoromethane (43 %) and vinyl chloride (69 %). Chloromethane, dichlorodifluoromethane and vinyl chloride were

reported as non-detect (U) in samples RI22-SBS0102, RI22-SBS0402 and RI22-SBD0402 and were qualified as estimated (UJ).

The LCS associated with sample RI22-SBS0802 had percent recoveries below the QC limits for chloromethane (57 %), dichlorodifluoromethane (35 %) and vinyl chloride (51 %). Chloromethane, dichlorodifluoromethane, and vinyl chloride were reported as non-detect (U) in sample RI22-SBS0802 and were qualified as estimated (UJ).
The LCS/LCSD associated with samples RI22-SBS0603 and RI22-SBS0702 had percent recoveries below the QC limits for dichlorodifluoromethane (59 and 60 %). Dichlorodifluoromethane was reported as non-detect (U) in samples RI22-SBS0603 and RI22-SBS0702 and was qualified as estimated (UJ).

L0601534 – The LCS associated with samples RI23-GWS0601, RI22-GWS0901, RI22-GWS1001, RI23-GWS0901, RI24-GWSMW301, RI24-GWSMW6S01 and RI22-GWSMW101 had a percent recovery above the QC limits (70-130%) for 2-butanone (131 %) and percent recoveries below the QC limits for 1,4-dioxane (63 %), tert-butyl alcohol (56 %) and tetrahydrofuran (63 %). The 2-butanone detection in sample RI22-GWS1001 was qualified as estimated (J). 1,4-Dioxane, tert-butyl alcohol and tetrahydrofuran were reported as non-detect (U) in samples RI23-GWS0601, RI22-GWS0901, RI22-GWS1001, RI23-GWS0901, RI24-GWSMW301, RI24-GWSMW6S01 and RI22-GWSMW101 and were qualified as estimated (UJ).

The LCS associated with samples RI23-GWD0901 and RI24-GWSEW101 had percent recoveries below the QC limits for 1,4-dioxane (44 %), tert-butyl alcohol (50 %) and tetrahydrofuran (65 %). 1,4-Dioxane, tert-butyl alcohol and tetrahydrofuran were reported as non-detect (U) in samples RI23-GWD0901 and RI24-GWSEW101 and were qualified as estimated (UJ).

L0601350 - The LCS/LCSD associated with samples RI24-SBS0102, RI24-SBS0202, RI24-SBS0302, RI24-SBS0403, RI24-SBS0503, RI24-SBS0602, RI24-SBS0702, RI22-SBS0202, RI22-SBS0301, and RI22-SBS0502 had a percent recovery below the QC limits (70-130%) for dichlorodifluormethane (59 and 60) and relative percent differences greater than the QC limit (30) for tert-butyl alcohol (31) and propionitrile (31). Results for these three compounds were non-detect (U) in all samples and were qualified as estimated (UJ).

Internal Standards

L0601412 – Internal standard fluorobenzene was below the lower QC limit in sample RI22-SBS0601. All compounds that were quantified using internal standard fluorobenzene were reported as non-detect (U) in sample RI22-SBS0601 and were qualified as estimated (UJ).

L0601350 – All three internal standards, 1,4-dichlorobenzene-d4, chlorobenzene-d5, and fluorobenzene, were below the lower QC limits in sample RI24-SBS0602. All compounds in sample RI24-SBS0602 were qualified as estimated (J/UJ).

The internal standard 1,4-dichlorobenzene-d4 was below the lower QC limit in sample RI22-SBS0502. All compounds that were quantified using internal standard 1,4-dichlorobenzene-d4 in sample RI22-SBS0502 were qualified as estimated (J/UJ).

3.0 SEMIVOLATILE ORGANIC COMPOUNDS ANALYSIS (8270C and 8011)

Data were evaluated for the following parameters:

* Data Completeness
* Preservation and Technical Holding Times
* Instrument Tuning
* Initial and Continuing Calibration
* Blank Contamination
* Surrogate Spike Compounds
* Matrix Spike/Matrix Spike Duplicate (MS/MSD)
  Laboratory Control Sample (LCS)
* Field Duplicate
* Internal Standards
* Target Compound Quantitation
* Electronic Evaluation Verification

  * = criteria were met for this parameter

With the exception of the following items discussed below, results are determined to be usable as reported by the laboratory.

Laboratory Control Sample

L0601534 – The LCS associated with samples RI24-GWSEW101, RI24-GWSMW301 and RI24-GWSMW6S01 had a percent recovery below the QC limits (40-140%) for aniline (28 %). Aniline was reported as non-detect (U) in samples RI24-GWSEW101, RI24-GWSMW301 and RI24-GWSMW6S01 and was qualified as estimated (UJ).

4.0 PESTICIDES (8081)

Data were evaluated for the following parameters:

* Data Completeness
* Preservation and Technical Holding Times
* Initial and Continuing Calibration
* Blank Contamination
* Surrogate Spike Compounds
* Matrix Spike/Matrix Spike Duplicate (MS/MSD)
* Laboratory Control Sample (LCS)
* Field Duplicate
* Target Compound Quantitation
* Electronic Evaluation Verification

* = criteria were met for this parameter

Results are determined to be usable as reported by the laboratory.

5.0 VOLATILE PETROLEUM HYDROCARBONS (MAVPH)

Data were evaluated for the following parameters:

* Data Completeness
* Preservation and Technical Holding Times
* Instrument Tuning
* Initial and Continuing Calibration
* Blank Contamination
* Surrogate Spike Compounds
* Matrix Spike/Matrix Spike Duplicate (MS/MSD)
* Laboratory Control Sample (LCS)
* Field Duplicate
* Internal Standards
* Target Compound Quantitation
* Electronic Evaluation Verification

* = criteria were met for this parameter

All criteria are met for this method. The data is usable as reported by the laboratory.

6.0 EXTRACTABLE PETROLEUM HYDROCARBONS (MAEPH)

Data were evaluated for the following parameters:

* Data Completeness
* Preservation and Technical Holding Times
* Instrument Tuning
* Initial and Continuing Calibration
  Blank Contamination
  Surrogate Spike Compounds
* Matrix Spike/Matrix Spike Duplicate (MS/MSD)
  Laboratory Control Sample (LCS)
* Field Duplicate
* Internal Standards
* Target Compound Quantitation
* Electronic Evaluation Verification

* = criteria were met for this parameter

With the exception of the following items discussed below, results are determined to be usable as reported by the laboratory.

Blank Contamination

M54181 – The C9-C18 Aliphatics range is reported in the method blank (8530 µg/kg). An action limit was established at five times the concentration reported in the blank. The results for C9-C18 Aliphatics in samples RI23-SBS0502, RI23-SBS0702, RI23-SBS0802, RI23-SBD0802, RI23-SBS0704, RI23-SBS0803 and, RI23-SBS1012 are less than the action limit and were qualified non-detect.

Surrogate Spike Compounds

M54261 – The percent recovery for 1-chlorooctadecane in samples RI23-SBS0902 (38), RI23-SBS0907 (36), and RI23-SBD0907 (34) are less than the lower QC control limit of 40. Sample results for aliphatic hydrocarbons were qualified estimated (J and UJ).

M54130 – The percent recovery for 1-chlorooctadecane in sample RI22-SBS0802 (36) is less than the lower QC control limit of 40. The result for aliphatic hydrocarbons were qualified estimated (J).

Laboratory Control Sample

M54130 – The LCSD percent recovery for naphthalene (38) is less than the lower QC control limit of 40. The results for naphthalene were qualified estimated (J/UJ) and are potentially biased low.

7.0 INORGANICS (6010B, 6020 and 7471A)

Analysis for elements was completed using Method 6010B, Method 6020, and Method 7471A.

Data were evaluated for the following parameters:

* Data Completeness
* Preservation and Technical Holding Times
* Initial and Continuing Calibration
  Blank Contamination
  Matrix Spike/Matrix Spike Duplicate (MS/MSD)
* Laboratory Control Sample (LCS)
  Field Duplicate
  Laboratory Duplicate
* Serial Dilution
* Interference Check Standard
* Target Compound Quantitation
* Electronic Evaluation Verification

* = criteria were met for this parameter

With the exception of the following items discussed below, results are determined to be usable as reported by the laboratory.

Blank Contamination

L0601350 – Blank contamination was observed in the initial and continuing calibration blanks associated with all soil samples for antimony. Action levels were established at five times the blank concentrations and were compared to sample raw data. The antimony detection in sample RI24-SBS0102 was below the action level and was qualified as non-detect (U).

Field Duplicate

L0602041 – The RPD between sample RI23-GWSMW1601 and its field duplicate RI23-GWSMW1601 was greater than the QC limit of 30 for total lead (63). Total lead detections in all samples in SDG L0602041 were qualified as estimated (J).

L0601534 – The RPD between sample RI23-GWS0901 and its field duplicate RI23-GWD0901 was greater than the QC limit of 30 for total lead (200). Total lead results in all water samples were qualified as estimated (J/UJ).

L0601485 – The RPD between sample RI23-GWS0801 and its field duplicate RI23-GWD0801 was greater than the QC limit of 30 for total lead (62). Total lead results in samples RI23-GWS0501, RI23-GWS0701, RI23-GWS0801, RI23-GWD0801, RI23-GWS1001, and RI23-GWS1101were positive and were qualified as estimated (J).

Laboratory Duplicate

L0601412 – The RPD between sample RI22-SBS0402 and its laboratory duplicate was greater than the QC limit of 35 for total lead (45). Total lead detections in all samples in SDG L0601412 were qualified as estimated (J).

L0601350 – The QC limit of +/- the reporting limit (0.0255) was exceeded between sample RI24-SBS0503 and its laboratory duplicate for thallium. Thallium detections in all soil samples were qualified as estimated (J).

Matrix Spike/Matrix Spike Duplicates

L0601534 – The MS/MSD associated with sample RI23-GWS0901 and its field duplicate RI23-GWD0901 had a percent recovery above the QC limits (75-125%) for total lead (126 %). Total lead detections in all water samples were qualified as estimated (J).

L0601350 – The MS associated with sample RI24-SBS0102 had a percent recovery below the QC limits (75-125%) for antimony (17 %). Antimony was reported or qualified as non-detect (U) in all associated soil samples and was qualified as estimated (J) and may be biased low.

Validation Completed by:
Brad LaForest - NRCC-EAC
Reviewed by:
Chris Ricardi - NRCC-EAC
March 22, 2006

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APPENDIX G-2

DATA VALIDATION SUMMARY
2007 ANALYSES

MACTEC

Data Validation Summary
May and June 2007 SAMPLING EVENT
KEMRON USARC GFPR
Lincoln, Rhode Island

1.0 INTRODUCTION

Fifteen soil samples and seventy-seven aqueous samples were collected from May 8th through June 27th, 2007 at the Kemron USARC GFPR sites in Lincoln, Rhode Island. Sites include the AMSA 68(G) Focused RI Site 04 Potential Past Disposal Area, Site 05 Former Gasoline UST, and Site 13 Septic System. Soil and water samples were collected for analyses determined for each location based on historical use and potential contamination. Soil samples were analyzed for one or more of the following parameters:

- Volatile organic compounds (VOC) by Method 8260B
- Diesel Range Organics (DRO) by Method 8015M
- Gasoline Range Organics (GRO) by Method 8015M
- Total Organic Carbon (TOC) by Method 9060

Aqueous samples were analyzed for one or more of the following parameters:

- VOCs by Method 8260B
- Total and dissolved lead by Method 6010B

All analyses were performed by ESS Laboratory Cranston, Rhode Island.

A Tier II validation was completed for all samples. For ten percent of samples a Tier III data validation was performed for VOC, and metals analyses. A chemist review was performed on the DRO, GRO, and TOC analyses. The data package was validated using Region I EPA-New England Data Validation Functional Guidelines for Evaluating Environmental Analyses (USEPA, 1996), Region I Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses (USEPA, 1988), Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (USEPA, 1989) and the Kemron USARC Rhode Island GFPR Quality Assurance Project Plan (Kemron, 2005).

The following samples and sample delivery groups (SDGs) are included in this data evaluation:

Field Sample ID	ESS SDG	Sample Date	Comment
Trip Blank	0705130	5/8/2007	
RI 23 GWPS 0303	0705130	5/8/2007	
RI 23 GWPS 0403	0705130	5/8/2007	
RI 23 GWPS 0603	0705130	5/8/2007	
RI 22 GPS 0501	0705130	5/8/2007	
RI 23 GWPS 0203	0705130	5/8/2007	
RI 23 GWPS 0103	0705130	5/8/2007	
RI 22 GPS 0601	0705130	5/8/2007	

Field Sample ID	ESS SDG	Sample Date	Comment
RI22 GPD 0101	0705130	5/8/2007	Duplicate
RI22 GPS 0101	0705130	5/8/2007	
RI22 GPS 0201	0705130	5/8/2007	
RI22 GPS0401	0705157	5/9/2007	
RI22-GPS0301	0705157	5/9/2007	
RI23-GPWS0607	0705157	5/9/2007	
RI23-GPWS0407	0705157	5/9/2007	
RI23-GPWS0503	0705157	5/9/2007	
RI23-GPWS0703	0705157	5/9/2007	
RI23-GPWS0307	0705157	5/9/2007	
RI23-GPWS0707	0705157	5/9/2007	
RI23-GPWS0507	0705157	5/9/2007	
RI22-GPS0701	0705157	5/9/2007	
RI23-GPWS0207	0705157	5/9/2007	
Trip Blank	0705177	5/10/2007	
Trip Blank	0705178	5/10/2007	
RI23-GPWS0107	0705177	5/10/2007	
RI22-SSS1100	0705178	5/10/2007	
RI22-SSS1201	0705178	5/10/2007	
RI22-SSS1301	0705178	5/10/2007	
RI22-SSS1401	0705178	5/10/2007	
RI22-SSD1501	0705178	5/10/2007	
RI22-SSMS1501	0705178	5/10/2007	
RI22-SSS1501	0705178	5/10/2007	
RI22-SSS1600	0705178	5/10/2007	
RI23-GPWS0907	0705177	5/10/2007	
RI23-GPWS0807	0705177	5/10/2007	
Trip Blank	0705209	5/11/2007	
RI23-GPWS1007	0705208	5/11/2007	
RI22-SSS1701	0705209	5/11/2007	
RI22-SSS1800	0705209	5/11/2007	
RI22-SSS1901	0705209	5/11/2007	
RI22-SSS2000	0705209	5/11/2007	
RI23-GPWS0115	0705208	5/11/2007	
RI23-GPWS0903	0705208	5/11/2007	
RI23-GPWS0215	0705208	5/11/2007	
Trip Blank	0705223	5/14/2007	
RI23-GPWS1107	0705223	5/14/2007	
RI23-GPWS0803	0705223	5/14/2007	
RI23-GPWS1115	0705223	5/14/2007	
RI23-GPWS0415	0705223	5/14/2007	
RI23-GPWS0815	0705223	5/14/2007	
Trip Blank	0705252	5/15/2007	
RI23-GPWS1103	0705252	5/15/2007	
RI23-GPWS1315	0705252	5/15/2007	

EB-1	0705252	5/15/2007	
RI23-GPWS1205	0705252	5/15/2007	
Field Sample ID	**ESS SDG**	**Sample Date**	**Comment**
RI23-GPWD1215	0705252	5/15/2007	Duplicate
RI23-GPWMS1215	0705252	5/15/2007	
RI23-GPWS1215	0705252	5/15/2007	
Trip Blank	0705276	5/16/2007	
RI23-GPW1405	0705276	5/16/2007	
RI23-MWS0901	0705276	5/16/2007	
Septic-1	0705276	5/16/2007	
RI23-GPWS1415	0705276	5/16/2007	
Trip Blank	0705290	5/17/2007	
RI22-GPS0114	0705290	5/17/2007	
RI22-GPS0214	0705290	5/17/2007	
RI23-GPWS1515	0705290	5/17/2007	
RI22-MWS14D01	0705314	5/18/2007	
RI22-MWS20D01	0705484	5/31/2007	
RI23-SBS10D15	0705483	5/31/2007	
RI23-SBS18D15	0705483	5/31/2007	
RI23-SBS19D07	0706009	6/1/2007	
RI23-GWSMW15D02	0706457	6/25/2007	Duplicate
TB-1	0706457	6/26/2007	
RI22-GWSMW202	0706457	6/26/2007	
RI23-GWSMW1502	0706457	6/26/2007	
RI23-GWSMW1602	0706457	6/26/2007	
RI23-GWSMW16D02	0706457	6/26/2007	
RI23-GWSMW1002	0706457	6/26/2007	
RI22-GWSMW102	0706457	6/26/2007	
RI23-GWSMW10D02	0706457	6/26/2007	
RI23-GWSMW14D02	0706457	6/26/2007	
RI23-GWDMW20D02	0706495	6/26/2007	
RI23-GWSMW20D02	0706495	6/26/2007	
RI22-GWSMW2102	0706495	6/26/2007	
RI22-GWSM2002	0706495	6/26/2007	
RI23-GWSMW21D02	0706495	6/26/2007	
TB-2	0706495	6/27/2007	
TB-3	0706497	6/27/2007	
RI22-GWSMWS02	0706495	6/27/2007	
RI22-GWSMW1402	0706495	6/27/2007	
RI23-GWSMW17D02	0706495	6/27/2007	
RI23-GWSMW1902	0706495	6/27/2007	
RI23-GWSMW1702	0706495	6/27/2007	
RI23-GWSMW27D02	0706495	6/27/2007	
RI23-GWSMW26D02	0706495	6/27/2007	
RI23-GWSMW2702	0706495	6/27/2007	
RI23-GWSMW1802	0706495	6/27/2007	

RI23-GWSMW18D02	0706495	6 27 2007	
RI23-GWSMW902	0706495	6 27 2007	
RI23-GWSMW2302	0706495	6 27 2007	
Field Sample ID	**ESS SDG**	**Sample Date**	**Comment**
RI23-GWSMW24D02	0706497	6 27 2007	
RI23-GWSMW22D02	0706497	6 27 2007	
RI23-GWSMW2202	0706497	6 27 2007	

Data qualifications were completed when necessary in accordance with the guidelines using the following qualifiers:

U = The target compound was not detected at concentrations greater than the associated quantitation limit;

J = The reported concentration is considered an estimated value;

R = Result is rejected and considered unusable.

With the exception of the items discussed below, quality control (QC) parameters and measurements checked during validation met requirements in the analytical method, validation guidelines, and quality assurance (QA) plan goals. Unless specified below, results are usable without qualification.

2.0 VOLATILE ORGANIC COMPOUNDS ANALYSIS (8260B)

Data were evaluated for the following parameters:

* Data Completeness
* Preservation and Technical Holding Times
* Instrument Tuning
  Initial and Continuing Calibration
  Blank Contamination
  Surrogate Spike Compounds
  Matrix Spike/Matrix Spike Duplicate (MS/MSD)
  Laboratory Control Sample (LCS)
  Field Duplicate
* Internal Standards
  Target Compound Quantitation
* Electronic Evaluation Verification

  * – criteria were met for this parameter

With the exception of the following items discussed below, results are determined to be usable as reported by the laboratory. Data qualifications and interpretations are presented by SDG.

Initial and Continuing Calibration

The data validation guidelines establish minimum response guidelines for target compounds in calibration standard runs. For a subset of VOC's including the ketones (acetone, 4-methyl-2-pentanone, and 2-butanone), 1,4-dioxane, 1,2-dibromo-3-chloropropane, and tetrahydrofuran the response was less than the minimum response in the guidelines. Positive results were qualified estimated (J) and non-detects were rejected (R) based on the guidelines. Specific details are summarized below for each SDG.

0705130 – In the initial calibration associated with samples RI 22 GPS 0601, RI 23 GWPS 0403, RI 22 GPS 0201, RI 22 GPS 0501, RI 23 GWPS 0303, and RI 23 GWPS 0603 the average relative response factor (RRF) for 2-butanone (0.0174), acetone (0.0136), tetrahydrofuran (0.0410), and 1,4-dioxane (0.00098) are less than the QC limit of 0.050. The percent relative standard deviation (RSD) for 1,2-dibromo-3-chloropropane (35.68) exceeds the QC limit of 30. The results for 2-butanone, tetrahydrofuran, and 1,4-dioxane in the associated samples are non-detect and were rejected (R). The result for acetone in sample RI 23 GWPS 0403 was qualified estimated (J). The remaining acetone results are non-detect and were rejected (R). The result for 1,2-dibromo-3-chloropropane in the associated samples are non-detect and were qualified estimated (UJ).

In the initial calibration associated with samples RI 22 GPS 0101, RI 22 GPD 0101, RI 23 GWPS 0103, and RI 23 GWPS 0203 the RRF for 1,4-dioxane (0.000563), 2-butanone (0.012), and acetone (0.0119) are less than the QC limit of 0.050. The result for 1,4-dioxane, 2-butanone, and acetone in the associated samples are non-detect and were rejected (R).

In the continuing calibration associated with all samples in SDG 0705130, the percent difference for 1,4-dioxane (45) and tetrahydrofuran (25.8) exceed the QC limit of 25. The RRF for acetone (0.0122, 0.0128, and 0.0140), 1,4-dioxane (0.00568 and 0.000701), 2-butanone (0.0169), and tetrahydrofuran (0.0435) are less than the QC limit of 0.050. The results for acetone, 1,4-dioxane, 2-butanone, and tetrahydrofuran were qualified previously under the initial calibration criteria.

0705157 – In the initial calibration associated with all samples in SDG 0705157, the RRF for 1,4-dioxane (0.0009), 2-butanone (0.0174), acetone (0.0136), and tetrahydrofuran (0.041) are less than the QC limit of 0.050. The RSD for 1,2-dibromo-3-chloropropane (36) exceeds the QC limit of 30. The sample results for 1,4-dioxane, and tetrahydrofuran are non-detect and were rejected (R). The reported detection for 2-butanone and acetone in sample RI23-GPWS0407 was qualified estimated (J). The remaining associated sample results for acetone and 2-butanone are non-detect and were rejected (R). The associated sample results for 1,2-dibromo-3-chloropropane are non-detect and were qualified estimated (J).

In the continuing calibration associated with all samples in SDG 0705157, the RRF for 1,4-dioxane (0.00038 and 0.00072), 2-butanone (0.0177 and 0.0155), acetone (0.0133 and 0.011), and tetrahydrofuran (0.0469 and 0.0410) are less than the QC limit of 0.050. The results for 1,4-dioxane, 2-butanone, acetone, and tetrahydrofuran were qualified previously under the initial calibration criteria.

0705177 – In the initial calibration associated with all samples in SDG 0705177, the RRF for 1,4-dioxane (0.00098), 2-butanone (0.0174), acetone (0.0136), and tetrahydrofuran (0.041) are less than the QC limit of 0.050. The RSD for 1,2-dibromo-3-chloropropane (36) exceeds the QC limit of 30. The sample results for 1,4-dioxane, 2-butanone, acetone, and tetrahydrofuran are non-detect and were rejected (R). The sample results for 1,2-dibromo-3-chloropropane are non-detect and were qualified estimated (J).

In the continuing calibration associated with all samples in SDG 0705177, the RRF for 1,4-dioxane (0.00042), 2-butanone (0.0177), acetone (0.0122), and tetrahydrofuran (0.0486) are less than the QC limit of 0.050. The results for 1,4-dioxane, 2-butanone, acetone, and tetrahydrofuran were qualified previously under the initial calibration criteria.

0705178 – In the initial calibration associated with all samples in SDG 0705178, the RRF for 1,2-dibromo-3-chloropropane (0.0474), 1,4-dioxane (0.0005), 2-butanone (0.009), 4-methyl-2-pentanone (0.041), acetone (0.0061), chloroethane (0.034), and tetrahydrofuran (0.025) are less than the QC limit of 0.050. The RSD for 1,2,4-trichlorobenzene (47), 1,2-dibromo-3-chloropropane (42), and n-butylbenzene (38) exceed the QC limit of 30. The sample results for 1,2-dibromo-3-chloropropane, 1,4-dioxane, 2-butanone, 4-methyl-2-pentanone, acetone, chloroethane, and tetrahydrofuran are non-detect and were rejected (R). The sample results for 1,2,4-trichlorobenzene, and n-butylbenzene are non-detect and were qualified estimated (UJ).

In the continuing calibration associated with all samples in SDG 0705178, the RRF for 1,4-dioxane (0.00066, 0.00050), 2-butanone (0.0097, 0.0096), 4-methyl-2-pentanone (0.043, 0.00435), acetone (0.0058, 0.0059), chloroethane (0.034, 0.031), and tetrahydrofuran (0.026, 0.024) are less than the QC limit of 0.050. The percent difference for 1,2-dichloroethane (27), 1,4-dioxane (28.4), and carbon tetrachloride (27) exceed the QC limit of 25. The sample results for 1,4-dioxane, 2-butanone , 4-methyl-2-pentanone, acetone , chloroethane, and tetrahydrofuran were qualified previously under the initial calibration criteria. The sample results for 1,2-dichloroethane, and carbon tetrachloride are non-detect and were qualified estimated (UJ).

0705208 -- In the initial calibration associated with all samples in SDG 0705208, the RRF for 1,4-dioxane (0.0009), 2-butanone (0.0174), acetone (0.0136), and tetrahydrofuran (0.041) are less than the QC limit of 0.050. The RSD for 1,2-dibromo-3-chloropropane (36) exceeds the QC limit of 30. The sample results for 1,4-dioxane, 2-butanone, acetone, and tetrahydrofuran are non-detect and were rejected (R). The sample results for 1,2-dibromo-3-chloropropane are non-detect and were qualified estimated (J).

In the continuing calibration associated with all samples in SDG 0705208, the RRF for 1,4-dioxane (0.00042), 2-butanone (0.0177), acetone (0.0122), and tetrahydrofuran (0.0486) are less than the QC limit of 0.050. The results for 1,4-dioxane, 2-butanone, acetone, and tetrahydrofuran were qualified previously under the initial calibration criteria.

0705209 In the initial calibration associated with all samples in SDG 0705209, the RRF for 1,2-dibromo-3-chloropropane (0.047), 1,4-dioxane (0.00054), 2-butanone (0.009), 4-methyl-2-pentanone (0.041), acetone (0.00061), chloroethane (0.034), and tetrahydrofuran (0.0255) are less than the QC limit of 0.050. The RSD for 1,2-dibromo-3-chloropropane (42) exceeds the QC limit of 30. The sample results for 1,2-dibromo-3-chloropropane, 1,4-dioxane, 2-butanone, 4-methyl-2-pentanone, acetone, chloroethane, and tetrahydrofuran are non-detect and were rejected (R).

In the continuing calibration associated with all samples in SDG 0705209, the RRF for 1,2-dibromo-3-chloropropane (0.047), 1,4-dioxane (0.00059), 2-butanone (0.0096), 4-methyl-2-pentanone (0.043), acetone (0.00059), chloroethane (0.032), and tetrahydrofuran (0.0248) are less than the QC limit of 0.050. The sample results for 1,2-dibromo-3-chloropropane, 1,4-dioxane, 2-butanone, 4-methyl-2-pentanone, acetone, chloroethane, and tetrahydrofuran were qualified previously under the initial calibration criteria.

0705223 – In the initial calibration associated with all samples in SDG 0705223, the RRF for 1,4-dioxane (0.00098), 2-butanone (0.0174), acetone (0.0136), and tetrahydrofuran (0.041) are less than the QC limit of 0.050. The RSD for 1,2-dibromo-3-chloropropane (36) exceeds the QC limit of 30. The sample results for 1,4-dioxane, 2-butanone, acetone, and tetrahydrofuran are non-detect and were rejected (R). The sample results for 1,2-dibromo-3-chloropropane are non-detect and were qualified estimated (J).

In the continuing calibration associated with all samples in SDG 0705223, the RRF for 1,4-dioxane (0.00042), 2-butanone (0.0177), acetone (0.0122), and tetrahydrofuran (0.0486) are less than the QC limit of 0.050. The results for 1,4-dioxane, 2-butanone, acetone, and tetrahydrofuran were qualified previously under the initial calibration criteria.

0705252 In the initial calibration associated with all samples in SDG 0705252, the RRF for 1,4-dioxane (0.00056), 2-butanone (0.012), and acetone (0.0119) are less than the QC limit of 0.050. The sample results for 1,4-dioxane, 2-butanone, and acetone are non-detect and were rejected (R).

In the continuing calibration associated with all samples in SDG 0705252, the RRF for 1,4-dioxane (0.00051 and 0.00086), 2-butanone (0.0139 and 0.0184), and acetone (0.0131 and 0.0126) are less than the QC limit of 0.050. The results for 1,4-dioxane, 2-butanone, and acetone were qualified previously under the initial calibration criteria.

0705276 In the initial calibration associated with all samples in SDG 0705276, the RRF for 1,4-dioxane (0.00098), 2-butanone (0.017), acetone (0.0136), and tetrahydrofuran (0.041) are less than the QC limit of 0.050. The RSD for 1,2-dibromo-3-chloropropane (36) exceeds the QC limit of 30. The sample results for 1,4-dioxane, 2-butanone, acetone, and tetrahydrofuran are non-detect and were rejected (R). The sample results for 1,2-dibromo-3-chloropropane are non-detect and were qualified estimated (UJ).

In the continuing calibration associated with all samples in SDG 0705276, the RRF for 1,4-dioxane (0.0011, .00095), 2-butanone (0.018, 0.017), acetone (0.016, 0.0134), and tetrahydrofuran (0.049) are less than the QC limit of 0.050. The percent difference for tetrahydrofuran (30) and trichlorofluoromethane (42) exceeds the QC limit of 25. The results for 1,4-dioxane, 2-butanone, acetone, and tetrahydrofuran were qualified previously under the initial calibration criteria. The result for trichlorofluoromethane in associated samples RI23-GPW1405, and RI23-GPWS1415 are non-detect and were qualified estimated (UJ).

0705290 – In the initial calibration associated with all samples in SDG 0705290, the RRF for 1,4-dioxane (0.00056), 2-butanone (0.012), and acetone (0.011) are less than the QC limit of 0.050. The sample results for 1,4-dioxane, 2-butanone, and acetone are non-detect and were rejected (R).

In the continuing calibration associated with all samples in SDG 0705290, the RRF for 1,4-dioxane (0.00037), 2-butanone (0.012), acetone (0.011), and tetrahydrofuran (0.043) are less than the QC limit of 0.050. The percent difference for 1,4-dioxane (34) exceeds the QC limit of 25. The results for 1,4-dioxane, 2-butanone, and acetone were qualified previously under the initial calibration criteria. The results for tetrahydrofuran are non-detect and were rejected (R).

0705314 – In the initial calibration associated with all samples in SDG 0705314, the RRF for 1,4-dioxane (0.00056), 2-butanone (0.012), and acetone (0.011) are less than the QC limit of 0.050. The sample result for 1,4-dioxane, 2-butanone, and acetone is non-detect and was rejected (R).

In the continuing calibration associated with all samples in SDG 0705314, the RRF for 1,4-dioxane (0.00056), 2-butanone (0.012), acetone (0.011), and tetrahydrofuran (0.043) are less than the QC limit of 0.050. The percent difference for 1,4-dioxane (34) exceeds the QC limit of 25. The result for 1,4-dioxane, 2-butanone, and acetone was qualified previously under the initial calibration criteria. The result for tetrahydrofuran is non-detect and was rejected (R).

0705483 In the initial calibration associated with all samples in SDG 0705483, the RRF for 1,2-dibromo-3-chloropropane (0.0497), 1,4-dioxane (0.0005), 2-butanone (0.009), 4-methyl-2-pentanone (0.041), acetone (0.0057), chloroethane (0.037), and tetrahydrofuran (0.025) are less than the QC limit of 0.050. The RSD for 1,2,4-trichlorobenzene (36), 1,2-dibromo-3-chloropropane (36), and naphthalene (32) exceed the QC limit of 30. The sample results for 1,2-dibromo-3-chloropropane, 1,4-dioxane, 2-butanone, 4-methyl-2-pentanone, acetone, chloroethane, and tetrahydrofuran are non-detect and were rejected (R). The sample results for 1,2,4-trichlorobenzene, and naphthalene are non-detect and were qualified estimated (UJ).

In the continuing calibration associated with all samples in SDG 0705483, the RRF for 1,4-dioxane (0.00036), 2-butanone (0.0089), 4-methyl-2-pentanone (0.040), acetone (0.0061), chloroethane (0.036), and tetrahydrofuran (0.025) are less than the QC limit of 0.050. The percent difference for 1,4-dioxane (35) exceeds the QC limit of 25. The sample results for 1,4-dioxane, 2-butanone , 4-methyl-2-pentanone, acetone , chloroethane, and tetrahydrofuran were qualified previously under the initial calibration criteria.

0705484 - In the initial calibration associated with all samples in SDG 0705484, the RRF for 1,4-dioxane (0.00098), 2-butanone (0.017), acetone (0.0136), and tetrahydrofuran (0.041) are less than the QC limit of 0.050. The RSD for 1,2-dibromo-3-chloropropane (36) exceeds the QC limit of 30. The sample result for 1,4-dioxane, 2-butanone, acetone, and tetrahydrofuran is non-detect and was rejected (R). The sample result for 1,2-dibromo-3-chloropropane is non-detect and was qualified estimated (UJ).

In the continuing calibration associated with all samples in SDG 0705484, the RRF for 1,4-dioxane (0.00025), 2-butanone (0.016), acetone (0.011), and tetrahydrofuran (0.038) are less than the QC limit of 0.050. The sample result for 1,4-dioxane, 2-butanone , acetone, and tetrahydrofuran was qualified previously under the initial calibration criteria.

0706009 – In the initial calibration associated with all samples in SDG 0706009, the RRF for 1,2-dibromo-3-chloropropane (0.0497), 1,4-dioxane (0.0005), 2-butanone (0.009), 4-methyl-2-pentanone (0.041), acetone (0.0057), chloroethane (0.037), and tetrahydrofuran (0.025) are less than the QC limit of 0.050. The RSD for 1,2,4-trichlorobenzene (36), 1,2-dibromo-3-chloropropane (36), and naphthalene (32) exceed the QC limit of 30. The sample result for 1,2-dibromo-3-chloropropane, 1,4-dioxane, 2-butanone, 4-methyl-2-pentanone, acetone, chloroethane, and tetrahydrofuran is non-detect and was rejected (R). The sample result for 1,2,4-trichlorobenzene is non-detect and was qualified estimated (UJ). The sample result for naphthalene was qualified estimated (J).

In the continuing calibration associated with all samples in SDG 0706009, the RRF for 1,4-dioxane (0.00036), 2-butanone (0.0089), 4-methyl-2-pentanone (0.040), acetone (0.0061), chloroethane (0.036), and tetrahydrofuran (0.025) are less than the QC limit of 0.050. The percent difference for 1,4-dioxane (35) exceeds the QC limit of 25. The sample results for 1,4-dioxane, 2-butanone , 4-methyl-2-pentanone, acetone , chloroethane, and tetrahydrofuran were qualified previously under the initial calibration criteria.

0706457 In the initial calibration associated with all samples in SDG 0706457, the RRF for 1,4-dioxane (0.030), 2-butanone (0.013), acetone (0.011) and tetrahydrofuran (0.035) are less than the QC limit of 0.050. The sample results for 1,4-dioxane, 2-butanone, acetone, and tetrahydrofuran are non-detect and were rejected (R).

In the continuing calibration associated with all samples in SDG 0706457, the RRF for 1,4-dioxane (0.0013, 0.0014, and 0.0014), 2-butanone (0.013, 0.013, and 0.013), acetone (0.010, 0.010, and 0.011), and tetrahydrofuran (0.033, 0.033, and 0.033) are less than the QC limit of 0.050. The percent difference for 1,4-dioxane (96, 95, and 95), and chloromethane (45, 53, and 37) exceeds the QC limit of 25. The results for 1,4-dioxane, 2-butanone, acetone and tetrahydrofuran were qualified previously under the initial calibration criteria. The results for chloromethane are non-detect and were qualified estimated (UJ).

0706495 -- In the initial calibration associated with all samples in SDG 0706495, the RRF for 1,4-dioxane (0.0039), 2-butanone (0.010), acetone (0.0088) and tetrahydrofuran (0.027) are less than the QC limit of 0.050. The RSD for 1,4-dioxane (150), and bromoform (35) exceed the QC limit of 30. The sample results for 1,4-dioxane, 2-butanone, acetone, and tetrahydrofuran are non-detect and were rejected (R). The results for bromoform are non-detect and were qualified estimated (UJ).

In the continuing calibration associated with all samples in SDG 0706495, the RRF for 1,4-dioxane (0.0008, .0008, .0016, and .0014), 2-butanone (0.011, 0.012, 0.013, and 0.013), acetone (0.009, 0.010, 0.011, and 0.011), and tetrahydrofuran (0.029, 0.034, 0.032, and 0.033) are less than the QC limit of 0.050. The percent difference for 1,4-dioxane (41, 35, 120, and 75), and chloromethane (35, and 28) exceeds the QC limit of 25. The results for 1,4-dioxane, 2-butanone, acetone and tetrahydrofuran were qualified previously under the initial calibration criteria. Results for chloromethane in samples RI23-GWSMW2702, RI23-GWSMW1702, RI23-GWSMW18D02, RI22-GWSMW1402, RI23-GWSMW17D02, RI23-GWSMW1902, RI23-GWSMW26D02, and RI23-GWSMW2302 were qualified estimated (J/UJ).

0706497 -- In the initial calibration associated with all samples in SDG 0706497, the RRF for 1,4-dioxane (0.0030), 2-butanone (0.013), acetone (0.011) and tetrahydrofuran (0.035) are less than the QC limit of 0.050. The RSD for 1,4-dioxane (160) exceeds the QC limit of 30. The sample results for 1,4-dioxane, 2-butanone, acetone, and tetrahydrofuran are non-detect and were rejected (R).

In the continuing calibration associated with all samples in SDG 0706497, the RRF for 1,4-dioxane (0.0014), 2-butanone (0.013), acetone (0.011), and tetrahydrofuran (0.033) are less than the QC limit of 0.050. The percent difference for 1,4-dioxane (95) exceeds the QC limit of 25. The results for 1,4-dioxane, 2-butanone, acetone and tetrahydrofuran were qualified previously under the initial calibration criteria.

Blank Evaluations

0705209 -- Blank contamination was observed in the trip blank associated with all samples in SDG 0705209 for methylene chloride. An action limit was established at ten times the reported methylene chloride concentration. The result for methylene chloride in associated samples is non-detect; no further action required.

0705483 Blank contamination was observed in the method blank associated with all samples in SDG 0705483 for methylene chloride. An action limit was established at ten times the reported methylene chloride concentration. The result for methylene chloride in associated samples are less than the action limit and were qualified non-detect (U) at the reporting limit.

0706009 – Blank contamination was observed in the method blank associated with all samples in SDG 0706009 for methylene chloride. An action limit was established at ten times the reported methylene chloride concentration. The result for methylene chloride is non-detect; no further action required.

Surrogates

0705177 The percent recovery for the surrogate toluene-d8 in sample RI23-GPWS0807 (188) exceeds the upper QC limit of 130. Reported detections in sample RI23-GPWS0807 were qualified estimated (J) and are potentially biased high.

0705208 – The percent recovery for the surrogate toluene-d8 in sample RI23-GPWS0115 (181) exceeds the upper QC limit of 130. Reported detections in sample RI23-GPWS0115 were qualified estimated (J) and are potentially biased high.

0706457 The percent recovery for toluene-d8 (174) in sample RI23-GWSMW1002 exceeds the upper QC limit of 130. Reported detections in sample RI23-GWSMW1002 were qualified estimated (J) and are potentially biased high.

0706495 – The percent recovery for toluene-d8 (191) in sample RI23-GWSMW18D02 exceeds the upper QC limit of 130. Reported detections from the undiluted analysis, in sample RI23-GWSMW18D02 were qualified estimated (J) and are potentially biased high.

Matrix Spike/Matrix Spike Duplicate

0706495 – The MS percent recovery for 1,4-dioxane (0) is less than the lower QC limit of 70. The MSD percent recovery for 1,4-dioxane (143), naphthalene (168), and bromomethane (137) exceed the upper QC limit of 130. The MS/MSD relative percent difference (RPD) for 1,2,3-trichlorobenzene (30), 1,4-dioxane (200), and naphthalene (31) exceeds the QC limit of 20. The result for bromomethane in the unspiked samples RI23-GWSMW20D02 and RI23-GWDMW20D02 is non-detect; no further action required. The result for 1,2,3-trichlorobenzene and naphthalene in the unspiked samples RI23-GWSMW20D02 and RI23-GWDMW20D02 is non-detect and was qualified estimated (UJ). The result for 1,4-dioxane was qualified previously under the initial calibration criteria.

0706497 The MS/MSD percent recoveries for 1,4-dioxane (8 and 10), and chloromethane (58 and 66) are less than the lower QC limit of 70. The MSD percent recovery for bromomethane (142) exceeds the upper QC limit of 130. The result for bromomethane in the unspiked sample RI23-GWSMW24D02 is non-detect; no further action required. The result for 1,4-dioxane was qualified previously under the initial calibration criteria.

Laboratory Control Sample

0705130 The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) percent recovery for 1,4-dioxane (350 and 220) exceeds the upper QC limit of 130. Results for 1,4-dioxane were qualified previously under the initial calibration criteria.

0705157 - The LCS percent recovery for 1,4-dioxane (68) is less than the lower QC limit of 70. The results for 1,4-dioxane were qualified previously under the initial calibration criteria.

0705177 - The LCS percent recovery for 1,4-dioxane (66) is less than the lower QC limit of 70. The results for 1,4-dioxane were qualified previously under the initial calibration criteria.

0705178 - The LCS/LCSD percent recoveries for 1,4-dioxane (144,139, and 136) and acetone (131 and 138) exceed the upper QC limit of 130. The results for 1,4-dioxane and acetone were qualified previously under the initial calibration criteria.

0705209 - The LCS percent recovery for 1,4-dioxane (132) exceeds the QC limit of 130. The result for 1,4-dioxane in associated samples are non-detect; no further action required.

0705252 – The LCS/LCSD percent recovery for 1,4-dioxane (350 and 222) exceeds the upper QC limit of 130. The results for 1,4-dioxanewere qualified previously under the initial calibration criteria.

0705276 – The LCS/LCSD percent recovery for 1,4-dioxane (302 and 177), 2-butanone (133), and acetone (133) exceeds the upper QC limit of 130. The result for 1,4-dioxane, 2-butanone, and acetone were qualified previously under the initial calibration criteria.

0705290 The LCS/LCSD percent recovery for 1,4-dioxane (361and 212) exceeds the upper QC limit of 130. The results for 1,4-dioxane were qualified previously under the initial calibration criteria.

0705314 – The LCS/LCSD percent recovery for 1,4-dioxane (361and 212) exceeds the upper QC limit of 130. The results for 1,4-dioxane were qualified previously under the initial calibration criteria.

0705483 – The LCS/LCSD percent recovery for dichlorodifluoromethane (133 and 132) exceeds the upper QC limit of 130. The result for dichlorodifluoromethane in the associated samples are non-detect; no further action required.

0705484 – The LCS percent recovery for hexachlorobutadiene (135) exceeds the upper QC limit of 130. The result for hexachlorobutadiene in the associated sample is non-detect; no further action required.

0706009 The LCS/LCSD percent recovery for dichlorodifluoromethane (133 and 132) exceeds the upper QC limit of 130. The result for dichlorodifluoromethane in the associated sample is non-detect; no further action required.

0706457 – The LCS/LCSD percent recovery for bromomethane (138, 136, and 131) exceeds the upper QC limit of 130. The result for bromomethane in the associated samples are non-detect; no further action required. The LCS/LCSD percent recoveries for 1,4-dioxane (10, 11, 9, 10, 9 and 9), chloromethane (52, 56, 55, 55, 63, and 65), and dichlorodifluoromethane (65 and 62) are less than the lower QC limit of 70.

The results for 1,4-dioxane were qualified previously under the initial calibration criteria. The results for chloromethane were qualified previously under the continuing calibration criteria.

The results for dichlorodifluoromethane in associated samples RI23-GWSMW15D02, RI22-GWSMW202, RI23-GWSMW1502, RI23-GWSMW1602, RI23-GWSMW16D02, RI23-GWSMW1002 are non-detect and were qualified estimated (UJ).

0706495 – The LCS/LCSD percent recovery for 1,4-dioxane (211, 177, and 144), acetone (139, 145, and 151) exceeds the upper QC limit of 130. The LCS/LCSD percent recoveries for chloromethane (64 and 67) are less than the lower QC limit of 70. The results for 1,4-dioxane and acetone were qualified previously under the initial calibration criteria. The results for chloromethane were qualified previously under the continuing calibration criteria.

0706497 –The LCS/LCSD percent recovery for 1,4-dioxane (9, and 9), and chloromethane (63, 65, and 58) are less than the lower QC limit of 70. The LCS percent recovery for bromomethane (131) exceeds the upper QC limit of 130. The result for bromomethane in the associated samples is non-detect; no further action required. The result for chloromethane in associated samples is non-detect and was qualified estimated (UJ). The results for 1,4-dioxane were qualified previously under the continuing calibration criteria.

Field Duplicate

0705252 The field duplicate RPD for benzene (54), ethylbenzene (200), o-xylene (200), sec butylbenzene (31), m/p-xylene (38), and total xylene (200) exceeds the QC limit of 30. The result for benzene, ethylbenzene, o-xylene, sec butylbenzene, m/p-xylene, and total xylene in the duplicate sample set RI23-GPWS1215 and RI23-GPWD1215 were qualified estimated (J/UJ).

Target Compound Quantitation

0705157 The result for isopropyl benzene and n-propylbenzene in sample RI23GWPS0103 exceeds the instrument calibration range in the undiluted analysis. The analytes were non-detect in the dilution analysis. The undiluted results are reported with an "E" qualifier. The "E" was removed in the final data set and the result for isopropyl benzene and n-propylbenzene in sample RI23GWPS0103 was qualified estimated (J).

0705177 - The result for 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, iso-propylbenzene, propylbenzene, and styrene in sample RI23-GPWS0107 exceed the instrument calibration range in the undiluted analysis. The analytes were non-detect in the dilution analysis. The undiluted results are reported with an "E" qualifier. The "E" was removed in the final data set and the result for 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, iso-propylbenzene, propylbenzene, and styrene in sample RI23-GPWS0107 was qualified estimated (J).

0706495 – The result for n-propylbenzene in sample RI23-GWSMW17D02 exceeded the instrument calibration range in the undiluted analysis. The analyte was non-detect in the dilution analysis. The undiluted result is reported with an "E" qualifier. The "E" was removed in the final data set and the result for n-propylbenzene in sample RI23-GWSMW17D02 was qualified estimated (J).

3.0 DIESEL RANGE ORGANICS (8015M)

Data were evaluated for the following parameters:

* Data Completeness
* Preservation and Technical Holding Times
* Instrument Tuning
* Initial and Continuing Calibration
  Blank Contamination
* Surrogate Spike Compounds
* Matrix Spike/Matrix Spike Duplicate (MS/MSD)
* Laboratory Control Sample (LCS)
* Field Duplicate
* Internal Standards
* Target Compound Quantitation
* Electronic Evaluation Verification

* = criteria were met for this parameter

With the exception of the following items discussed below, results are determined to be usable as reported by the laboratory.

Blank Contamination

0705178 - In the method blank associated with all samples in SDG 0705178, DRO is reported. The chromatograms for the method blank and samples were reviewed. The area for the blank contamination does not match the analyte areas for the samples. Based upon professional judgment, no further action required.

4.0 GASOLINE RANGE ORGANICS (8015M)

Data were evaluated for the following parameters:

* Data Completeness
* Preservation and Technical Holding Times
* Instrument Tuning
* Initial and Continuing Calibration
  Blank Contamination
  Surrogate Spike Compounds
* Matrix Spike/Matrix Spike Duplicate (MS/MSD)
* Laboratory Control Sample (LCS)
  Field Duplicate
* Internal Standards

* Target Compound Quantitation
* Electronic Evaluation Verification

* = criteria were met for this parameter

With the exception of the following items discussed below, results are determined to be usable as reported by the laboratory.

Blank Evaluations

0705178 Blank contamination was observed in the trip blank associated with all samples in SDG 0705178 for GRO. The chromatograms for the method blank and samples were reviewed. The area for the blank contamination does not match the analyte areas for the samples. Based upon professional judgment, no further action required.

Surrogates

0705178 The percent recovery for the surrogate trifluorotoluene in sample RI22-SSS1401 (147) exceeds the QC limit of 130. The result for GRO in sample RI22-SSS1401 was qualified estimated (J) and is potentially biased high.

Field Duplicate

0705178 The field duplicate RPD (84) for the field duplicate set exceeds the QC limit of 50. The result for GRO in samples RI22-SSS1501, RI22-SSD1501, and RI22-SSMS1501 was qualified estimated (J).

5.0 INORGANICS (6010B)

Analysis for elements was completed using Method 6010B, Method 6020, and Method 7471A.

Data were evaluated for the following parameters:

* Data Completeness
* Preservation and Technical Holding Times
* Initial and Continuing Calibration
* Blank Contamination
* Matrix Spike/Matrix Spike Duplicate (MS/MSD)
* Laboratory Control Sample (LCS)
* Field Duplicate
* Laboratory Duplicate
* Serial Dilution
* Interference Check Standard
* Target Compound Quantitation
* Electronic Evaluation Verification

* = criteria were met for this parameter

Results are determined to be usable as reported by the laboratory.

6.0 TOTAL ORGANIC CARBON (9060)

Data were evaluated for the following parameters:

* Data Completeness
* Preservation and Technical Holding Times
* Initial and Continuing Calibration
* Blank Contamination
* Matrix Spike/Matrix Spike Duplicate (MS/MSD)
* Laboratory Control Sample (LCS)
* Field Duplicate
* Laboratory Duplicate
* Target Compound Quantitation
* Electronic Evaluation Verification

* = criteria were met for this parameter

Results are determined to be usable as reported by the laboratory.

REFERENCES:

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U.S. Environmental Protection Agency (USEPA). 1996. "Region I. EPA-New England Data Validation Functional Guidelines for Evaluating Environmental Analyses, Parts I and II," Quality Assurance Unit Staff; Office of Environmental Measurement and Evaluation; December, 1996.

U.S. Environmental Protection Agency (USEPA). 1988. "Region I. Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses;" Hazardous Site Evaluation Division; November, 1988.

U.S. Environmental Protection Agency (USEPA). 1989. "Region I. Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses;" Hazardous Site Evaluation Division; February, 1989.

Validation Completed by: Wolfgang D Calicchio

August 23, 2007

Reviewed by:

APPENDIX H

2007 SURVEY DATA

ASEC CORPORATION
ENGINEERS • ARCHITECTS • LAND SURVEYORS

25 May 2007

Mr. Rod Pendleton
MACTEC Engineering & Consulting, Inc.
511 Congress Street
Portland, ME

RE: Survey Report
U.S. Army Reserve, AMSA 68 (G)
Lincoln, RI

Dear Mr. Pendleton:

The survey for the above referenced site was performed using GPS, Total Station and Differential leveling techniques.

The horizontal GPS component utilized a Trimble 4800, dual frequency system. We used the systems RTK (real time kinematic) function. The base was placed on a known NGS Station identified as LW1765 and we checked the system accuracy by collecting data at two nearby NGS station, LW1769 & LW0418. The resulting coordinates were within 0.11' of their record location (positional accuracy required is ± 1 foot). We then collected coordinate values for traverse points 100 through 103. A Topcon 300 series total station, positioned at these traverse points, was used to collect the actual well locations and the other features shown on the plan. The vertical component utilized a Wild compensating level, model # NA0. We used NGS station LW1765 as a starting point and checked into NGS station LW 1766 within 0.015 feet. NGS values for these stations are reported in NAVD 88. Corpswin conversion software was used to convert NAVD 88 values to NGVD values. The converted values were then spot checked using Vertcom software with results being within 0.01 feet. We completed a level run holding the value for station LW 1765 which closed with no error. During our level run we placed temporary bench marks (TBM) on utility poles at the site. These TBM's were used to collect elevation data for the wells. The level run for the well data resulted in an error of closure of 0.002 feet per setup (turning points) for ten setups. This error was distributed through the setups to determine the final elevations (vertical accuracy required is ± 0.01 feet).

Please refer to the data summary sheet (excel format) for the well positions, elevations and pertinent notes. Please refer to the plan for the well positions relative to the building and fences.

Sincerely,

Michael A. Coleman
Professional Land Surveyor, RI License #1902

100 Hallet Street ▪ Boston, MA 02124
Tel: 617-265-7777 Fax: 617-265-0478
Email: survey@aseccorp.com

JN 1587 - U.S. ARMY RESERVE CENTER AMSA 68(G)

PREPARED FOR MACTEC ENGINEERING AND CONSULTING

DESCRIPTION	CAD PT #	NORTHING	EASTING	ELEVATION			NOTES
				GROUND	TOP CASING	TOP PVC	
EW-01	1067	305969	332245	448.4	450.08	449.11	4" ST. CASE/2" PVC
EW-03	1070	305945	332131	447.4	449.63	448.82	4" ST. CASE/2" PVC
GP-01	1057	306108	332123	------	------		
GP-02	1008	306155	332050	------	------		
GP-03	1002	306247	331881	------	------		
GP-04	1001	306373	332034	------	------		
GP-05	1003	306197	332043	------	------		
GP-06	1004	306162	332097	------	------		
GP-07	1000	306450	332075	------	------		
GPW-01	1040	306039	332047	------	------		
GPW-02	1042	306022	332049	------	------		
GPW-03	1044	305983	332071	------	------		
GPW-04	1043	306009	332065	------	------		
GPW-05	1047	306024	332080	------	------		
GPW-06	1045	306009	332082	------	------		
GPW-07	1046	306013	332101	------	------		
GPW-08	1041	306033	332033	------	------		
GPW-09	1048	306002	332030	------	------		
GPW-10	1023	306060	332038	------	------		
GPW-11	1039	306034	332053	------	------		
GPW-12	1022	306051	332019	------	------		
GPW-13	1024	306058	332056	------	------		
GPW-14	1075	306034	332013	------	------		
MW-1	1016	306149	332001	447.9	449.60	449.20	4" ST. CASE/2" PVC
MW-2	1052	306078	332105	448.0	450.02	449.78	4" ST. CASE/2" PVC
MW-3	1068	305907	332326	447.4	449.88	449.83	4" ST. CASE/2" PVC
MW-4	1030	305690	332162	448.1	450.33	450.19	4" ST. CASE/2" PVC
MW-5	1015	306051	331942	448.7	450.41	450.15	4" ST. CASE/2" PVC
MW-6B	1066	305977	332230	448.4	449.89	449.63	4" ST. CASE/2" PVC
MW-6D	1065	305979	332226	448.4	450.07	449.55	4" ST. CASE/2" PVC
MW-6S	1064	305985	332221	448.6	449.29	449.15	4" ST. CASE/2" PVC
MW-7	1069	305901	332218	447.8	449.77	449.58	4" ST. CASE/2" PVC
MW-8	1020	306118	332052	447.9	449.85	449.67	4" ST. CASE/2" PVC
MW-9	1049	306029	332073	447.8	447.79	447.60	4" ST. CASE/2" PVC
MW-10	1021	306079	332060	447.8	447.82	447.79	4" ST. CASE/2" PVC
MW-11	1035	305937	331842	447.3	449.75	449.47	4" ST. CASE/2" PVC
MW-12	1031	305851	332000	447.1	NO CASING	447.04	2" PVC
MW-13	1071	305845	332074	448.0	450.66	449.91	4" ST. CASE/2" PVC
MW-14	1019	306126	332039	447.6	449.98	449.67	2" ST. CASE/1" PVC
MW-14D	1077	306128	332036	447.3	NO CASING	447.19	1" PVC
MW-15	1051	306090	332084	447.6	450.14	449.98	2" ST. CASE/1" PVC
MW-16	1017	306109	332020	447.8	447.80	447.72	2" ST. CASE/1" PVC
MW-17	1050	306062	332081	447.7	447.74	447.63	2" ST. CASE/1" PVC
MW-18	1037	306056	332058	448.4	450.73	450.42	2" ST. CASE/1" PVC
MW-19	1038	306039	332052	448.0	447.99	447.78	4" ST. CASE/1" PVC
MW-20	1009	306197	332003	447.3	447.24	447.02	5" ST. CASE/1" PVC
MW-20D	1076	306195	332008	447.7	NO CASING	447.51	1" PVC
MW-21	1014	306160	332054	447.0	447.05	446.80	4" ST. CASE/1" PVC
MW-22	1058	306110	332123	446.9	446.82	446.61	4" ST. CASE/1" PVC
SS-11	1018	306140	332020	------	------		
SS-12	1006	306126	332052	------	------		
SS-13	1053	306107	332077	------	------		
SS-14	1056	306084	332109	------	------		
SS-15	1063	306069	332120	------	------		
SS-16	1062	306064	332102	------	------		
SS-17	1007	306142	332049	------	------		
SS-18	1005	306124	332073	------	------		
SS-19	1054	306107	332097	------	------		
SS-20	1055	306094	332116	------	------		

ASEC CORPORATION
ENGINEERS • ARCHITECTS • LAND SURVEYORS

20 June 2007

Mr. Rod Pendleton
MACTEC Engineering & Consulting, Inc.
511 Congress Street
Portland, ME

RE: Survey Report
U.S. Army Reserve, AMSA 68 (G)
Lincoln, RI

Dear Mr. Pendleton:

The survey for the above referenced site was performed using GPS, Total Station and Differential leveling techniques.

The horizontal GPS component utilized a Trimble 4800, dual frequency system. We used the systems RTK (real time kinematic) function. The base was placed on a known NGS Station identified as LW1765 and we checked the system accuracy by collecting data at two nearby NGS station, LW1769 & LW0418. The resulting coordinates were within 0.11' of their record location (positional accuracy required is ± 1 foot). We then collected coordinate values for traverse points 100 through 103. A Topcon 300 series total station, positioned at these traverse points, was used to collect the actual well locations and the other features shown on the plan. The vertical component utilized a Wild compensating level, model # NA0. We used NGS station LW1765 as a starting point and checked into NGS station LW 1766 within 0.015 feet. NGS values for these stations are reported in NAVD 88. Corpswin conversion software was used to convert NAVD 88 values to NGVD values. The converted values were then spot checked using Vertcom software with results being within 0.01 feet. We completed a level run holding the value for station LW 1765 which closed with no error. During our level run we placed temporary bench marks (TBM) on utility poles at the site. These TBM's were used to collect elevation data for the wells. The level run for the well data resulted in an error of closure of 0.002 feet per setup (turning points) for ten setups. This error was distributed through the setups to determine the final elevations (vertical accuracy required is ± 0.01 feet).

Please refer to the data summary sheet (excel format) for the well positions, elevations and pertinent notes. Please refer to the plan for the well positions relative to the building and fences.

On June 19, 2007 additional survey work was performed to locate 12 monitoring wells. Horizontal and vertical control set during our initial visit was utilized for the new wells and the reported results are within the allowable accuracies. We also placed another temporary benchmark (TBM #3) on an existing hydrant for future use. Please refer to the revised data summary sheet (excel format) for the well positions, elevations and pertinent notes.

Sincerely,

Michael A. Coleman
Professional Land Surveyor, RI License #1902

100 Hallet Street ▪ Boston, MA 02124
Tel: 617-265-7777 Fax: 617-265-0478
Email: survey@aseccorp.com

JN 1587 - U.S. ARMY RESERVE CENTER AMSA 68(G)

PREPARED FOR MACTEC ENGINEERING AND CONSULTING

ORIGINAL SURVEY MAY 17, 2007; NEW SURVEY JUNE 19, 2007 (IN RED)

DESCRIPTION	CAD PT #	NORTHING	EASTING	ELEVATION			NOTES
				GROUND	TOP CASING	TOP PVC	
EW-01	1067	305969	332245	448.4	450.08	449.11	4" ST. CASE/2" PVC
EW-03	1070	305945	332131	447.4	449.63	448.82	4" ST. CASE/2" PVC
GP-01	1057	306108	332123	------	------		
GP-02	1008	306155	332050	------	------		
GP-03	1002	306247	331881	------	------		
GP-04	1001	306373	332034	------	------		
GP-05	1003	306197	332043	------	------		
GP-06	1004	306162	332097	------	------		
GP-07	1000	306450	332075	------	------		
GPW-01	1040	306039	332047	------	------		
GPW-02	1042	306022	332049	------	------		
GPW-03	1044	305983	332071	------	------		
GPW-04	1043	306009	332065	------	------		
GPW-05	1047	306024	332080	------	------		
GPW-06	1045	306009	332082	------	------		
GPW-07	1046	306013	332101	------	------		
GPW-08	1041	306033	332033	------	------		
GPW-09	1048	306002	332030	------	------		
GPW-10	1023	306060	332038	------	------		
GPW-11	1039	306034	332053	------	------		
GPW-12	1022	306051	332019	------	------		
GPW-13	1024	306058	332056	------	------		
GPW-14	1075	306034	332013	------	------		
MW-1	1016	306149	332001	447.9	449.60	449.20	4" ST. CASE/2" PVC
MW-2	1052	306078	332105	448.0	450.02	449.78	4" ST. CASE/2" PVC
MW-3	1068	305907	332326	447.4	449.88	449.83	4" ST. CASE/2" PVC
MW-4	1030	305690	332162	448.1	450.33	450.19	4" ST. CASE/2" PVC
MW-5	1015	306051	331942	448.7	450.41	450.15	4" ST. CASE/2" PVC
MW-6B	1066	305977	332230	448.4	449.89	449.63	4" ST. CASE/2" PVC
MW-6D	1065	305979	332226	448.4	450.07	449.55	4" ST. CASE/2" PVC
MW-6S	1064	305985	332221	448.6	449.29	449.15	4" ST. CASE/2" PVC
MW-7	1069	305901	332218	447.8	449.77	449.58	4" ST. CASE/2" PVC
MW-8	1020	306118	332052	447.9	449.85	449.67	4" ST. CASE/2" PVC
MW-9	1049	306029	332073	447.8	447.79	447.60	4" ST. CASE/2" PVC
MW-10	1021	306079	332060	447.8	447.82	447.79	4" ST. CASE/2" PVC
MW-10D	1082	306078	332062	447.8	447.88	447.60	4" ST. CASE/1" PVC
MW-11	1035	305937	331842	447.3	449.75	449.47	4" ST. CASE/2" PVC
MW-12	1031	305851	332000	447.1	NO CASING	447.04	2" PVC
MW-13	1071	305845	332074	448.0	450.66	449.91	4" ST. CASE/2" PVC
MW-14	1019	306126	332039	447.6	449.98	449.67	2" ST. CASE/1" PVC
MW-14D	1077	306128	332036	447.3	NO CASING	447.19	1" PVC
MW-15	1051	306090	332084	447.6	450.14	449.98	2" ST. CASE/1" PVC
MW-15D	1086	306088	332084	447.6	447.69	447.60	4" ST. CASE/1" PVC
MW-16	1017	306109	332020	447.8	447.80	447.72	2" ST. CASE/1" PVC
MW-16D	1080	306108	332017	447.9	447.84	447.45	4" ST. CASE/1" PVC
MW-17	1050	306062	332081	447.7	447.74	447.63	2" ST. CASE/1" PVC
MW-17D	1085	306060	332083	447.8	447.75	447.33	4" ST. CASE/1" PVC
MW-18	1037	306056	332058	448.4	450.73	450.42	2" ST. CASE/1" PVC
MW-18D	1087	306053	332058	448.3	448.29	448.05	4" ST. CASE/1" PVC
MW-19	1038	306039	332052	448.0	447.99	447.78	4" ST. CASE/1" PVC
MW-20	1009	306197	332003	447.3	447.24	447.02	5" ST. CASE/1" PVC
MW-20D	1076	306195	332008	447.7	NO CASING	447.51	1" PVC
MW-21	1014	306160	332054	447.0	447.05	446.80	4" ST. CASE/1" PVC
MW-21D	1079	306159	332057	446.9	446.91	446.66	4" ST. CASE/1" PVC
MW-22	1058	306110	332123	446.9	446.82	446.61	4" ST. CASE/1" PVC
MW-22D	1089	306109	332126	446.8	446.84	446.73	4" ST. CASE/1" PVC
MW-23	1088	306032	332035	448.6	448.62	448.38	4" ST. CASE/1" PVC
MW-24D	1078	306161	332021	447.5	447.49	447.36	3" ST. CASE/1" PVC
MW-26D	1081	306053	332019	448.8	448.77	448.43	3" ST. CASE/1" PVC
MW-27	1083	305981	332094	447.4	447.39	447.25	3" ST. CASE/1" PVC
MW-27D	1084	305983	332090	447.6	447.58	447.44	4" ST. CASE/1" PVC
SS-11	1018	306140	332020	------	------		
SS-12	1006	306126	332052	------	------		
SS-13	1053	306107	332077	------	------		
SS-14	1056	306084	332109	------	------		
SS-15	1063	306069	332120	------	------		
SS-16	1062	306064	332102	------	------		
SS-17	1007	306142	332049	------	------		
SS-18	1005	306124	332073	------	------		
SS-19	1054	306107	332097	------	------		
SS-20	1055	306094	332116	------	------		

APPENDIX I

HYDROGEOLOGIC CALCULATIONS

HYDROGEOLOGIC CALCULATIONS
USARC Lincoln, RI

Groundwater Elevation data from May 23, 2007

HORIZONTAL GRADIENT CALCULATIONS - SHALLOW OVERBURDEN

May 23, 2007 Shallow Overburden Groundwater Elevation Data

Flow direction to the Northwest from EW-03 (GW Elev. 446.14) to MW-17 (GW Elev. 445.46)

	GW Elev. (ft, MSL)
EW-03	446.14
MW-17	445.46

Approx. Dist. Between points 65 ft

Horiz. Gradient = (446.14-445.46)/65= 0.0105 foot/foot

May 23, 2007 Shallow Overburden Groundwater Elevation Data

Flow direction to the Northwest from MW-14 (GW Elev. 445.19) to MW-20 (GW Elev. 443.74)

	GW Elev. (ft, MSL)
MW-14	445.19
MW-20	443.74

Approx. Dist. Between points 75 ft

Horiz. Gradient = (445.19-443.74)/75= 0.0193 foot/foot

June 25, 2007 Shallow Overburden Groundwater Elevation Data

Flow direction to the North from MW-27 (GW Elev. 443.075) to MW-17 (GW Elev. 442.82)

	GW Elev. (ft, MSL)
MW-27	443.075
MW-17	442.82

Approx. Dist. Between points 77 ft

Horiz. Gradient = (443.075-442.82)/77= 0.0033 foot/foot

June 25, 2007 Shallow Overburden Groundwater Elevation Data

Flow direction to the North from MW-16 (GW Elev. 442.36) to MW-20 (GW Elev. 440.53)

	GW Elev. (ft, MSL)
MW-16	442.36
MW-20	440.53

Approx. Dist. Between points 82 ft

Horiz. Gradient = (442.36-440.53)/82= 0.0223 foot/foot

Prepared by: DRP 08/03/2007
Checked by: RAL 08/09/2007

HORIZONTAL GRADIENT CALCULATIONS - DEEP OVERBURDEN

June 25, 2007 Deep Overburden Groundwater Elevation Data

Flow direction to the Northwest from MW-14D (GW Elev. 442.2) to MW-20D (GW Elev. 440.64)

	GW Elev. (ft, MSL)
MW-14D	442.2
MW-20D	440.64

Approx. Dist. Between points 75 ft

Horiz. Gradient = (442.2-440.64)/75= 0.0208 foot/foot

VERTICAL GRADIENT CALCULATIONS

June 25, 2007 Shallow and Deep Overburden Groundwater Elevation Data

Loc_ID	GW Elevation - 6/25/2007 (ft, MSL)	Top of Screen (ft,bgs)	Bottom of Screen (ft,bgs)	Screen Mid-Point (ft, bgs)	Vertical Hydraulic Gradient (ft/ft)	
MW-10	442.81	6	16	11	-0.450	▼
MW-10D	441.46	9	19	14		
MW-14	442.26	2	12	7	-0.008	▼
MW-14D	442.20	10	20	15		
MW-15	442.60	2	12	7	-0.038	▼
MW-15D	442.39	10.2	15.2	12.7		
MW-16	442.36	2	12	7	-0.039	▼
MW-16D	442.14	10.2	15.2	12.7		
MW-17	442.82	2	12	7	-0.016	▼
MW-17D	442.68	13.5	18.5	16		
MW-18	442.80	1	11	6	0.057	▲
MW-18D	443.04	5.2	15.2	10.2		
MW-20	440.53	2	12	7	0.014	▲
MW-20D	440.64	10	20	15		
MW-21	441.72	2	12	7	0.018	▲
MW-21D	441.87	12.5	17.5	15		
MW-22	442.37	2	12	7	0.001	▲
MW-22D	442.38	12	17	14.5		
MW-27	443.08	2	12	7	0.003	▲
MW-27D	443.10	12	17	14.5		

HYDRAULIC CONDUCTIVITY ESTIMATES

The Nobis, 2004 RI Report indicates in Section 8.0 - Conclusions that there appears to be a discrepancy between the hydraulic conductivity estimates and the given plume configuration. The RI Report indicates that the borehole permeability results (ranging from 0.0266 ft/day to 0.275 ft/day in MW-8 and MW-13, respectively) are either on the on the lower end of published values or lower than published ranges for silty sands (Fetter, 1988; Dominico and Schwartz, 1990).

Silty sands K range	0.00001 cm/sec 0.028 ft/day	0.001 cm/sec 2.83 ft/day	(Fetter, 1988)
	0.00002 cm/sec 0.057 ft/day	0.02000 cm/sec 56.7 ft/day	Domenico & Schwartz, 1990)

Prepared by: DRP 08/03/2007
Checked by: RAL 08/09/2007

As a means to check the hydraulic conductivites from the borehole permeability results, the following calculations present an estimate of hydraulic conductivities at the AMSA 68 (G) facility using recharge and anticipated flow through the aquifer:

Sites 04 - PDA and 05 - Former Gasoline UST

Assumptions:				
	aquifer thickness (b) =	10	ft	
	recharge =	10	in/yr	
	flowpath width =	150	ft	
	recharge area (140 x 160 feet)	22400	sq ft	
	horizontal gradient =	0.0139	foot/foot	(avg. of shallow overburden gradients)

Total Recharge = (140)*(160)*(10/12)/(365)
51.1 cu ft/day

Q = K*i*A A = (150 ft)*(10 ft) = 1500 sq. ft.
K = Q/(i*A)
= 2.46 ft/day

The estimated K values from recharge calculations (~5 to 10 ft/day) are within the published ranges for silty sands, and significantly higher than borehole permeability results presented in the Nobis, 2004 RI Report (0.0266 ft/day to 0.275 ft/day).

ESTIMATED GROUNDWATER FLOW VELOCITIES

Assume:

Porosity (n) =	0.3		
Hydr. Cond. (K)* =	2.46	ft/day	* K is the calculated value from estimate of aquifer recharge, and is within the range of published values for silty sand

Sites 04 - PDA and 05 - Former Gasoline UST

Gradient (i) =	0.0139		(avg. of shallow overburden gradients)

Flow Velocity = (K * i)/n
= 0.1136 feet/day
= 41 feet/year

Prepared by: DRP 08/03/2007
Checked by: RAL 08/09/2007

APPENDIX J

2006-2007 SI ANALYTICAL DATA

APPENDIX J-1
SOIL ANALYTICAL RESULTS 2006-2007
SITE 04 - PDA

param_name	Industrial/ Commercial DEC (ppm)	GA Leachability (ppm)	SS-01 RI22-SBS0102 1/19/2006 1-2 ft	SS-02 RI22-SBS0202 1/18/2006 1-2 ft	SS-03 RI22-SBS0301 1/18/2006 0-1 ft	SS-04 RI22-SBS0402 1/19/2006 1-2 ft	SS-05 RI22-SBS0502 1/18/2006 1-2 ft	SS-06 RI22-SBS0601 1/19/2006 0-1 ft	SS-06 RI22-SBS0603 1/19/2006 2-3 ft	SS-07 RI22-SBS0702 1/19/2006 1-2 ft
Volatile Organics (mg/Kg)										
1,1,1,2-Tetrachloroethane	220		0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 U	0.00764 U	0.00601 U
1,1,1-Trichloroethane	10000	11	0.75 U	0.00309 J	0.00613 U	0.697 U	0.00108 J	0.00533 UJ	0.00764 U	0.00601 U
1,1,2,2-Tetrachloroethane	29		0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 UJ	0.00764 U	0.00601 U
1,1,2-Trichloro-1,2,2-Trifluoroethane			1.5 U	0.012 U	0.0123 U	1.39 U	0.0119 U	0.0107 UJ	0.0153 U	0.012 U
1,1,2-Trichloroethane	100	0.1	0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 UJ	0.00533 U	0.00764 U	0.00601 U
1,1-Dichloroethane	10000		0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 UJ	0.00764 U	0.00601 U
1,1-Dichloroethene	9.5	0.7	0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 UJ	0.00764 U	0.00601 U
1,1-Dichloropropene			0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 UJ	0.00764 U	0.00601 U
1,2,3-Trichlorobenzene			0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 U	0.00764 U	0.00601 U
1,2,3-Trichloropropane			0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 UJ	0.00764 U	0.00601 U
1,2,4-Trichlorobenzene	10000	140	0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 U	0.00764 U	0.00601 U
1,2,4-Trimethylbenzene			8.13	0.00599 U	0.0992 J	8.45	1030	0.00134 J	0.0839 J	20.3 J
1,2-Dibromo-3-chloropropane	4.1		0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 U	0.00764 U	0.00601 U
1,2-Dibromoethane	0.07	0.0005	0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 UJ	0.00764 U	0.00601 U
1,2-Dichlorobenzene	10000	41	0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 U	0.00764 U	0.00601 U
1,2-Dichloroethane	63	0.1	0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 UJ	0.00764 U	0.00601 U
1,2-Dichloropropane	84	0.1	0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 UJ	0.00533 UJ	0.00764 U	0.00601 U
1,3,5-Trimethylbenzene			3.56	0.00599 U	0.0576 J	4.59	326	0.00533 U	0.00453 J	11.5 J
1,3-Dichlorobenzene	10000	41	0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 U	0.00764 U	0.00601 U
1,3-Dichloropropane			0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 U	0.00764 U	0.00601 U
1,4-Dichlorobenzene	240	41	0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 U	0.00764 U	0.00601 U
1,4-Dioxane			15 U	0.12 U	0.123 U	13.9 U	0.119 U	0.107 U	0.153 U	0.12 U
1-Chlorohexane										
2,2-Dichloropropane			0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 UJ	0.00764 U	0.00601 U
2-Butanone	10000		R	0.00592 J	0.0154 J	R	0.0646 J	0.0107 UJ	0.0153 U	0.0154 J
2-Chlorotoluene			0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 U	0.00764 U	0.00601 U
2-Hexanone			1.5 U	0.012 U	0.0123 U	1.39 U	0.0119 U	0.0107 UJ	0.0153 U	0.012 U
4-Chlorotoluene			0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 U	0.00764 U	0.00601 U
4-iso-Propyltoluene			0.645 J	0.00599 U	0.0166 J	0.763	56.2 J	0.00533 U	0.00764 U	2.96 J
4-Methyl-2-pentanone	10000		R	0.012 U	0.0123 U	R	0.0119 U	0.0107 UJ	0.0153 U	0.012 U
Acetone	10000		R	0.0706	0.0763 J	R	0.195 J	0.0107 UJ	0.0153 U	0.0736 J
Acrylonitrile			15 U	0.12 U	0.123 U	13.9 U	0.119 U	0.107 UJ	0.153 U	0.12 U
Benzene	200	0.2	0.75 U	0.00599 U	0.00613 U	0.697 U	0.012 J	0.00533 UJ	0.00764 U	0.000927 J
Bromobenzene			0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 U	0.00764 U	0.00601 U
Bromochloromethane			0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 UJ	0.00764 U	0.00601 U
Bromodichloromethane	92		0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 UJ	0.00533 UJ	0.00764 U	0.00601 U
Bromoform	720		0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 UJ	0.00533 U	0.00764 U	0.00601 U
Bromomethane	2900		1.5 U	0.012 U	0.0123 U	1.39 U	0.0119 U	0.0107 UJ	0.0153 U	0.012 U
Butane, 2-methoxy-2-methyl-			1.5 U	0.012 U	0.0123 U	1.39 U	0.0119 U	0.0107 U	0.0153 U	0.012 U
Carbon disulfide			0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 UJ	0.00764 U	0.00601 U
Carbon tetrachloride	44	0.4	0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 UJ	0.00533 UJ	0.00764 U	0.00601 U
Chlorobenzene	10000	3.2	0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 U	0.00764 U	0.00601 U
Chlorodibromomethane	68		0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 UJ	0.00533 U	0.00764 U	0.00601 U

APPENDIX J-1
SOIL ANALYTICAL RESULTS 2006-2007
SITE 04 - PDA

param_name	Industrial/ Commercial DEC (ppm)	GA Leachability (ppm)	SS-01 RI22-SBS0102 1/19/2006 1-2 ft	SS-02 RI22-SBS0202 1/18/2006 1-2 ft	SS-03 RI22-SBS0301 1/18/2006 0-1 ft	SS-04 RI22-SBS0402 1/19/2006 1-2 ft	SS-05 RI22-SBS0502 1/18/2006 1-2 ft	SS-06 RI22-SBS0601 1/19/2006 0-1 ft	SS-06 RI22-SBS0603 1/19/2006 2-3 ft	SS-07 RI22-SBS0702 1/19/2006 1-2 ft
Chloroethane			1.5 U	0.012 U	0.0123 U	1.39 U	0.0119 U	0.0107 UJ	0.0153 U	0.012 U
Chloroform	940		0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 UJ	0.00764 U	0.00601 U
Chloromethane			1.5 UJ	0.012 U	0.0123 U	1.39 UJ	0.0119 U	0.0107 UJ	0.0153 U	0.012 U
Cis-1,2-Dichloroethene	10000	1.7	0.75 U	0.00599 U	0.00613 U	0.697 U	0.0135 J	0.00533 UJ	0.00764 U	0.0121 J
cis-1,3-Dichloropropene			0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 UJ	0.00533 UJ	0.00764 U	0.00601 U
Dibromomethane			0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 UJ	0.00764 U	0.00601 U
Dichlorodifluoromethane			1.5 UJ	0.012 UJ	0.0123 UJ	1.39 UJ	0.0119 UJ	0.0107 UJ	0.0153 UJ	0.012 UJ
Diethyl ether			1.5 U	0.012 U	0.0123 U	1.39 U	0.0119 U	0.0107 U	0.0153 U	0.012 U
Diisopropylether			1.5 U	0.012 U	0.0123 U	1.39 U	0.0119 U	0.0107 U	0.0153 U	0.012 U
Ethyl benzene	10000	27	1.05	0.00599 U	0.00334 J	0.697 U	0.105 J	0.00533 U	0.00764 U	0.0108 J
Ethyl-t-Butyl Ether			1.5 U	0.012 U	0.0123 U	1.39 U	0.0119 U	0.0107 U	0.0153 U	0.012 U
Hexachlorobutadiene	73		0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 U	0.00764 U	0.00601 U
Isopropylbenzene	10000		0.305 J	0.00599 U	0.00601 J	0.455 J	25 J	0.00533 U	0.00792 J	0.0586 J
Methyl Tertbutyl Ether	10000	0.9	0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 UJ	0.00764 U	0.00601 U
Methylene chloride	760		0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 UJ	0.00764 U	0.00601 U
Naphthalene	10000	**0.8**	1.92	0.012 U	0.0265 J	0.106 J	7.03 J	0.00445 J	0.00771 J	1.91 J
n-Butylbenzene			1.26	0.00599 U	0.0408 J	0.695 J	53 J	0.00533 U	0.00136 J	4.53 J
o-Xylene			2.12	0.00599 U	0.00806 J	0.697 U	29.6 J	0.00533 U	0.00112 J	0.0374 J
Propionitrile			0.75 U	0.00599 UJ	0.00613 UJ	0.697 U	0.00593 UJ	0.00533 U	0.00764 U	0.00601 U
Propylbenzene			0.908	0.00599 U	0.0154 J	1.37	77.5 J	0.00533 U	0.00934 J	0.215 J
sec-Butylbenzene			0.393 J	0.00599 U	0.0181 J	0.567 J	34 J	0.00533 U	0.00345 J	0.133 J
Styrene	190	2.9	0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 U	0.00764 U	0.00601 U
t-Butyl alcohol			15 U	0.12 UJ	0.123 UJ	13.9 U	0.119 UJ	0.107 U	0.153 U	0.12 U
tert-Butylbenzene			0.75 U	0.00599 U	0.00164 J	0.0763 J	4.8 J	0.00533 U	0.00175 J	0.0328 J
Tetrachloroethene	110	0.1	0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 U	0.00764 U	0.00601 U
Tetrahydrofuran			7.5 U	0.0599 U	0.0613 U	6.97 U	0.0593 U	0.0533 U	0.0764 U	0.0601 U
Toluene	10000	32	0.0916 J	0.00599 U	0.000909 J	0.697 U	1.12 J	0.00533 U	0.00101 J	0.00969 J
trans-1,2-Dichloroethene	10000	3.3	0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 U	0.00533 UJ	0.00764 U	0.00601 U
trans-1,3-Dichloropropene			0.75 U	0.00599 U	0.00613 U	0.697 U	0.00593 UJ	0.00533 U	0.00764 U	0.00601 U
trans-1,4-Dichloro-2-butene			1.5 U	0.012 U	0.0123 U	1.39 U	0.0119 U	0.0107 U	0.0153 U	0.012 U
Trichloroethene	520	0.2	0.75 U	0.000853 J	0.00613 U	0.697 U	0.00209 J	0.00533 UJ	0.00764 U	0.00601 U
Trichlorofluoromethane			1.5 U	0.012 U	0.0123 U	1.39 U	0.0119 U	0.0107 UJ	0.0153 U	0.012 U
Vinyl acetate										
Vinyl chloride	3	0.3	1.5 UJ	0.012 U	0.0123 U	1.39 UJ	0.0119 U	0.0107 UJ	0.0153 U	0.012 U
Xylene, m/p			3.36	0.00599 U	0.00443 J	0.072 J	8.59 J	0.00533 U	0.000823 J	0.0615 J
Xylenes, Total	10000	540								
Inorganics (mg/Kg)										
Lead	500		15.1 J	43.5	124	16.7 J	10.5	86.1 J	16.7 J	16 J
Percent Solids **(%)**			84.4	77.1	83.6	75.7	80.8	84.8	72.1	78.2

APPENDIX J-1
SOIL ANALYTICAL RESULTS 2006-2007
SITE 04 - PDA

param_name	Industrial/ Commercial DEC (ppm)	GA Leachability (ppm)	SS-01 RI22-SBS0102 1/19/2006 1-2 ft	SS-02 RI22-SBS0202 1/18/2006 1-2 ft	SS-03 RI22-SBS0301 1/18/2006 0-1 ft	SS-04 RI22-SBS0402 1/19/2006 1-2 ft	SS-05 RI22-SBS0502 1/18/2006 1-2 ft	SS-06 RI22-SBS0601 1/19/2006 0-1 ft	SS-06 RI22-SBS0603 1/19/2006 2-3 ft	SS-07 RI22-SBS0702 1/19/2006 1-2 ft
TPH (mg/Kg)										
Diesel Range Organics										
Gasoline Range Organics										
VPH (mg/Kg)										
Benzene	200	0.2	0.67 U	0.7 U	0.54 U	0.78 U	0.8 U	0.67 U	0.9 U	0.62 U
Ethyl benzene	10000	27	1.68	0.7 U	0.54 U	0.78 U	0.8 U	0.67 U	0.9 U	0.62 U
Methyl Tertbutyl Ether	10000	0.9	0.27 U	0.28 U	0.22 U	0.31 U	0.32 U	0.27 U	0.36 U	0.25 U
Naphthalene	10000	**0.8**	4.51	0.7 U	4.37	0.78 U	11.3	0.67 U	0.9 U	2.76
o-Xylene			1.89	0.7 U	1.89	0.78 U	34.1	0.67 U	0.9 U	0.434 J
Toluene	10000	32	0.67 U	0.7 U	0.54 U	0.78 U	0.694 J	0.67 U	0.9 U	0.62 U
Xylene, m/p			3.37	0.7 U	0.458 J	0.78 U	7.95	0.67 U	0.9 U	0.572 J
C5-C8 Aliphatics			13 U	14 U	17.8	16 U	85.7	13 U	18 U	12 U
C5-C8 Aliphatics (unadj.)			13 U	14 U	18	16 U	86.4	13 U	18 U	12 U
C9-C10 Aromatics (unadj.)			156	14 U	306	86.4	1710	13 U	18 U	242
C9-C12 Aliphatics			92.6	14 U	241	112	1980	13 U	18 U	248
C9-C12 Aliphatics (unadj.)			256	14 U	549	199	3730	13 U	18 U	491
EPH (mg/Kg)										
2-Methylnaphthalene	10000		5.19	0.62 U	2.05	0.66 U	6.75	0.56 U	0.68 U	1.96
Acenaphthene	10000		0.734	0.62 U	0.59 U	0.66 U	0.6 U	0.56 U	0.68 U	0.498 J
Acenaphthylene	10000		0.57 U	0.62 U	0.59 U	0.66 U	0.6 U	0.56 U	0.68 U	0.62 U
Anthracene	10000		0.57 U	0.62 U	0.59 U	0.66 U	0.6 U	0.56 U	0.68 U	0.62 U
Benzo(a)anthracene	7.8		0.57 U	0.62 U	0.59 U	0.66 U	0.6 U	0.56 U	0.68 U	0.62 U
Benzo(a)pyrene	0.8	240	0.57 U	0.62 U	0.59 U	0.66 U	0.6 U	0.56 U	0.68 U	0.62 U
Benzo(b)fluoranthene	7.8		0.57 U	0.62 U	0.59 U	0.66 U	0.6 U	0.56 U	0.68 U	0.62 U
Benzo(ghi)perylene	10000		0.558 J	0.62 U	1.31	0.687	0.625	0.823	2.27	1.84
Benzo(k)fluoranthene	78		0.57 U	0.62 U	0.59 U	0.66 U	0.6 U	0.56 U	0.68 U	0.62 U
Chrysene	780		0.57 U	0.62 U	0.59 U	0.66 U	0.6 U	0.56 U	0.68 U	0.62 U
Dibenz(a,h)anthracene	0.8		0.57 U	0.62 U	0.59 U	0.66 U	0.6 U	0.56 U	0.68 U	0.62 U
Fluoranthene	10000		0.57 U	0.62 U	0.59 U	0.66 U	0.6 U	0.642	0.68 U	0.62 U
Fluorene	10000		0.806	0.62 U	1.08	0.66 U	1.47	0.56 U	0.68 U	0.62 U
Indeno(1,2,3-cd)pyrene	7.8		0.57 U	0.62 U	0.59 U	0.66 U	0.6 U	0.56 U	0.68 U	0.62 U
Naphthalene	10000	**0.8**	1.63 J	0.62 U	0.474 J	0.66 UJ	4.8	0.56 UJ	0.68 UJ	2.02 J
Phenanthrene	10000		0.724	0.62 U	0.959	0.66 U	1.56	0.56 U	0.68 U	0.561 J
Pyrene	10000		0.57 U	0.62 U	0.59 U	0.66 U	0.6 U	0.491 J	0.68 U	0.62 U
C11-C22 Aromatics			398	28.4	1240	22.2 J	398	35.1	26 J	154
C11-C22 Aromatics (unadj.)			409	29.2	1240	23.8 J	415	39.5	30.2	162
C19-C36 Aliphatics			2090	40	4410	13.1	758	70.4	15.9	660
C9-C18 Aliphatics			396	12.4	1770	67.4	4170	15.5	21.4	1360

APPENDIX J-1
SOIL ANALYTICAL RESULTS 2006-2007
SITE 04 - PDA

param_name	Industrial/ Commercial DEC (ppm)	GA Leachability (ppm)	SS-07 RI22-SBS0711 1/25/2006 10-11 ft	SS-08 RI22-SBS0802 1/19/2006 1-2 ft	SS-09 RI22-SBS0902 1/24/2006 1-2 ft	SS-10 RI22-SBS1002 1/25/2006 1-2 ft	SS-11 RI22-SSS1100 5/10/2007 0-1 ft	SS-12 RI22-SSS1201 5/10/2007 1-2 ft	SS-13 RI22-SSS1301 5/10/2007 1-2 ft	SS-14 RI22-SSS1401 5/10/2007 1-2 ft
Volatile Organics (mg/Kg)										
1,1,1,2-Tetrachloroethane	220		0.528 U	0.671 U	1.49 U	2.79 U	0.137 U	0.157 U	0.159 U	0.145 U
1,1,1-Trichloroethane	10000	11	0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
1,1,2,2-Tetrachloroethane	29		0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
1,1,2-Trichloro-1,2,2-Trifluoroethane			1.06 U	1.34 U	2.99 U	5.59 U				
1,1,2-Trichloroethane	100	0.1	0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
1,1-Dichloroethane	10000		0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
1,1-Dichloroethene	9.5	0.7	0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
1,1-Dichloropropene			0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
1,2,3-Trichlorobenzene			0.528 U	0.671 UJ	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
1,2,3-Trichloropropane			0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
1,2,4-Trichlorobenzene	10000	140	0.528 U	0.671 UJ	1.49 U	2.79 U	0.0685 UJ	0.0783 UJ	0.0797 UJ	0.0726 UJ
1,2,4-Trimethylbenzene			15	17.6	54.8 J	54.7 J	0.0685 U	0.0783 U	6.83	3.71
1,2-Dibromo-3-chloropropane	4.1		0.528 U	R	1.49 U	2.79 U	R	R	R	R
1,2-Dibromoethane	0.07	0.0005	0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
1,2-Dichlorobenzene	10000	41	0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
1,2-Dichloroethane	63	0.1	0.528 U	0.671 U	1.49 U	2.79 U	0.0685 UJ	0.0783 UJ	0.0797 UJ	0.0726 UJ
1,2-Dichloropropane	84	0.1	0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
1,3,5-Trimethylbenzene			6.35	8.01	29.6 J	31.9 J	0.0685 U	0.0783 U	2.63	2.01
1,3-Dichlorobenzene	10000	41	0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
1,3-Dichloropropane			0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
1,4-Dichlorobenzene	240	41	0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
1,4-Dioxane			10.6 U	13.4 U	29.9 U	55.9 U	R	R	R	R
1-Chlorohexane							0.0685 U	0.0783 U	0.0797 U	0.0726 U
2,2-Dichloropropane			0.528 U	0.671 U	1.49 U	2.79 U	0.137 U	0.157 U	0.159 U	0.145 U
2-Butanone	10000		1.06 U	R	2.99 U	5.59 U	R	R	R	R
2-Chlorotoluene			0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
2-Hexanone			1.06 U	1.34 U	2.99 U	5.59 U	0.685 U	0.783 U	0.797 U	0.726 U
4-Chlorotoluene			0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
4-iso-Propyltoluene			1.39	1.24	7.82 J	8.38 J	0.0685 U	0.0783 U	0.263	5.84
4-Methyl-2-pentanone	10000		R	R	R	R	R	R	R	R
Acetone	10000		R	R	R	R	R	R	R	R
Acrylonitrile			R	13.4 U	R	R				
Benzene	200	0.2	0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Bromobenzene			0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Bromochloromethane			0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Bromodichloromethane	92		0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Bromoform	720		0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Bromomethane	2900		1.06 U	1.34 U	2.99 U	5.59 U	0.137 U	0.157 U	0.159 U	0.145 U
Butane, 2-methoxy-2-methyl-			1.06 U	1.34 U	2.99 U	5.59 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Carbon disulfide			0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Carbon tetrachloride	44	0.4	0.528 U	0.671 U	1.49 U	2.79 U	0.0685 UJ	0.0783 UJ	0.0797 UJ	0.0726 UJ
Chlorobenzene	10000	3.2	0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Chlorodibromomethane	68		0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U

APPENDIX J-1
SOIL ANALYTICAL RESULTS 2006-2007
SITE 04 - PDA

param_name	Industrial/ Commercial DEC (ppm)	GA Leachability (ppm)	SS-07 RI22-SBS0711 1/25/2006 10-11 ft	SS-08 RI22-SBS0802 1/19/2006 1-2 ft	SS-09 RI22-SBS0902 1/24/2006 1-2 ft	SS-10 RI22-SBS1002 1/25/2006 1-2 ft	SS-11 RI22-SSS1100 5/10/2007 0-1 ft	SS-12 RI22-SSS1201 5/10/2007 1-2 ft	SS-13 RI22-SSS1301 5/10/2007 1-2 ft	SS-14 RI22-SSS1401 5/10/2007 1-2 ft
Chloroethane			1.06 U	1.34 U	2.99 U	5.59 U	R	R	R	R
Chloroform	940		0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Chloromethane			1.06 U	1.34 UJ	2.99 U	5.59 U	0.137 U	0.157 U	0.159 U	0.145 U
Cis-1,2-Dichloroethene	10000	1.7	0.528 U	0.284 J	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
cis-1,3-Dichloropropene			0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Dibromomethane			0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Dichlorodifluoromethane			1.06 U	1.34 UJ	2.99 U	5.59 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Diethyl ether			1.06 U	1.34 U	2.99 U	5.59 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Diisopropylether			1.06 U	1.34 U	2.99 U	5.59 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Ethyl benzene	10000	27	2.44	0.546 J	0.537 J	0.579 J	0.0685 U	0.0783 U	0.212	0.103
Ethyl-t-Butyl Ether			1.06 U	1.34 U	2.99 U	5.59 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Hexachlorobutadiene	73		0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Isopropylbenzene	10000		0.916	0.43 J	1.05 J	1.19 J	0.0685 U	0.0783 U	0.276	0.145
Methyl Tertbutyl Ether	10000	0.9	0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Methylene chloride	760		0.528 U	0.671 U	1.49 U	2.79 U	0.343 U	0.392 U	0.398 U	0.363 U
Naphthalene	10000	**0.8**	2.17	0.56 J	9.76 J	9.91 J	0.0685 U	0.0783 U	0.623	0.799
n-Butylbenzene			3.09	1.7	14.8 J	18.8 J	0.0685 UJ	0.0783 UJ	0.0797 UJ	0.0726 UJ
o-Xylene			2.45	0.907	1.51 J	1.3 J	0.0685 U	0.0783 U	0.44	0.492
Propionitrile			0.528 U	0.671 U	1.49 U	2.79 U				
Propylbenzene			2.42	1.53	4.67 J	4.22 J	0.0685 U	0.0783 U	0.931	0.405
sec-Butylbenzene			0.998	0.56 J	3.04 J	3.84 J	0.0685 U	0.0783 U	0.25	0.222
Styrene	190	2.9	0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
t-Butyl alcohol			10.6 U	13.4 U	29.9 U	55.9 U				
tert-Butylbenzene			0.153 J	0.127 J	0.95 J	1.37 J	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Tetrachloroethene	110	0.1	0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Tetrahydrofuran			5.28 U	6.71 U	14.9 U	27.9 U	R	R	R	R
Toluene	10000	32	0.528 U	0.462 J	0.223 J	2.79 U	0.0685 U	0.0783 U	0.132	0.222
trans-1,2-Dichloroethene	10000	3.3	0.528 U	0.0947 J	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
trans-1,3-Dichloropropene			0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
trans-1,4-Dichloro-2-butene			1.06 U	1.34 U	2.99 U	5.59 U				
Trichloroethene	520	0.2	0.528 U	0.671 U	1.49 U	2.79 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Trichlorofluoromethane			1.06 U	1.34 U	2.99 U	5.59 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Vinyl acetate							0.343 U	0.392 U	0.398 U	0.363 U
Vinyl chloride	3	0.3	1.06 U	1.34 UJ	2.99 U	5.59 U	0.0685 U	0.0783 U	0.0797 U	0.0726 U
Xylene, m/p			7.78	2	2.49 J	1.39 J	0.137 U	0.157 U	0.62	0.449
Xylenes, Total	10000	540					0.206 U	0.235 U	1.06	0.941
Inorganics (mg/Kg)										
Lead	500		7.49	12.6 J	23.4	30.3				
Percent Solids **(%)**			91.4	80.7	84.3	84.7				

APPENDIX J-1
SOIL ANALYTICAL RESULTS 2006-2007
SITE 04 - PDA

param_name	Industrial/ Commercial DEC (ppm)	GA Leachability (ppm)	SS-07 RI22-SBS0711 1/25/2006 10-11 ft	SS-08 RI22-SBS0802 1/19/2006 1-2 ft	SS-09 RI22-SBS0902 1/24/2006 1-2 ft	SS-10 RI22-SBS1002 1/25/2006 1-2 ft	SS-11 RI22-SSS1100 5/10/2007 0-1 ft	SS-12 RI22-SSS1201 5/10/2007 1-2 ft	SS-13 RI22-SSS1301 5/10/2007 1-2 ft	SS-14 RI22-SSS1401 5/10/2007 1-2 ft
TPH (mg/Kg)										
Diesel Range Organics							46.5 U	68.5	625	2750
Gasoline Range Organics							1.61 U	4.24	50.8	126 J
VPH (mg/Kg)										
Benzene	200	0.2	0.56 U	0.72 U	0.61 U	0.76 U				
Ethyl benzene	10000	27	0.56 U	1.2	0.61 U	0.76 U				
Methyl Tertbutyl Ether	10000	0.9	0.23 U	0.29 U	0.24 U	0.3 U				
Naphthalene	10000	**0.8**	1.05	1.71	6.2	9.95				
o-Xylene			1.26	0.919	4.71	3.26				
Toluene	10000	32	0.56 U	3.19	0.61 U	0.76 U				
Xylene, m/p			2.18	2.47	2.16	1.11				
C5-C8 Aliphatics			11.8	14 U	13	16.2				
C5-C8 Aliphatics (unadj.)			11.9	14 U	13.3	16.3				
C9-C10 Aromatics (unadj.)			69.1	120	550	675				
C9-C12 Aliphatics			58.9	52.1	318	422				
C9-C12 Aliphatics (unadj.)			131	176	875	1100				
EPH (mg/Kg)										
2-Methylnaphthalene	10000		3.7	0.61 U	4.69	7.46				
Acenaphthene	10000		0.603	0.61 U	0.644	0.778				
Acenaphthylene	10000		0.52 U	0.61 U	0.58 U	0.57 U				
Anthracene	10000		0.52 U	0.61 U	0.58 U	0.57 U				
Benzo(a)anthracene	7.8		0.52 U	0.61 U	0.58 U	0.57 U				
Benzo(a)pyrene	0.8	240	0.52 U	0.61 U	0.58 U	0.57 U				
Benzo(b)fluoranthene	7.8		0.52 U	0.61 U	0.58 U	0.57 U				
Benzo(ghi)perylene	10000		0.52 U	1.35	0.58 U	0.465 J				
Benzo(k)fluoranthene	78		0.52 U	0.61 U	0.58 U	0.57 U				
Chrysene	780		0.52 U	0.61 U	0.58 U	0.57 U				
Dibenz(a,h)anthracene	0.8		0.52 U	0.61 U	0.58 U	0.57 U				
Fluoranthene	10000		0.52 U	0.61 U	0.58 U	0.57 U				
Fluorene	10000		0.63	0.61 U	0.631	1.67				
Indeno(1,2,3-cd)pyrene	7.8		0.52 U	0.61 U	0.58 U	0.57 U				
Naphthalene	10000	**0.8**	1.17	1.85 J	3.33	3.42				
Phenanthrene	10000		0.565	0.61 U	0.471 J	1.43				
Pyrene	10000		0.52 U	0.61 U	0.58 U	0.57 U				
C11-C22 Aromatics			625	43.7	878	596				
C11-C22 Aromatics (unadj.)			632	47.9	888	613				
C19-C36 Aliphatics			1210	182 J	4870	808				
C9-C18 Aliphatics			1860	256 J	4380	2730				

APPENDIX J-1
SOIL ANALYTICAL RESULTS 2006-2007
SITE 04 - PDA

param_name	Industrial/ Commercial DEC (ppm)	GA Leachability (ppm)	SS-15 RI22-SSS1501 5/10/2007 1-2 ft	SS-16 RI22-SSS1600 5/10/2007 0-1 ft	SS-17 RI22-SSS1701 5/11/2007 1-2 ft	SS-18 RI22-SSS1800 5/11/2007 0-1 ft	SS-19 RI22-SSS1901 5/11/2007 1-2 ft	SS-20 RI22-SSS2000 5/11/2007 0-1 ft
Volatile Organics (mg/Kg)								
1,1,1,2-Tetrachloroethane	220		0.132 U	0.135 U	0.141 U	0.0886 U	0.152 U	0.0973 U
1,1,1-Trichloroethane	10000	11	0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
1,1,2,2-Tetrachloroethane	29		0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
1,1,2-Trichloro-1,2,2-Trifluoroethane								
1,1,2-Trichloroethane	100	0.1	0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
1,1-Dichloroethane	10000		0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
1,1-Dichloroethene	9.5	0.7	0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
1,1-Dichloropropene			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
1,2,3-Trichlorobenzene			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
1,2,3-Trichloropropane			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
1,2,4-Trichlorobenzene	10000	140	0.066 UJ	0.0677 UJ	0.0704 U	0.0443 U	0.0762 U	0.0487 U
1,2,4-Trimethylbenzene			0.11	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
1,2-Dibromo-3-chloropropane	4.1		R	R	R	R	R	R
1,2-Dibromoethane	0.07	0.0005	0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
1,2-Dichlorobenzene	10000	41	0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
1,2-Dichloroethane	63	0.1	0.066 UJ	0.0677 UJ	0.0704 U	0.0443 U	0.0762 U	0.0487 U
1,2-Dichloropropane	84	0.1	0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
1,3,5-Trimethylbenzene			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
1,3-Dichlorobenzene	10000	41	0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
1,3-Dichloropropane			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
1,4-Dichlorobenzene	240	41	0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
1,4-Dioxane			R	R	R	R	R	R
1-Chlorohexane			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
2,2-Dichloropropane			0.132 U	0.135 U	0.141 U	0.0886 U	0.152 U	0.0973 U
2-Butanone	10000		R	R	R	R	R	R
2-Chlorotoluene			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
2-Hexanone			0.66 U	0.677 U	0.704 U	0.443 U	0.762 U	0.487 U
4-Chlorotoluene			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
4-iso-Propyltoluene			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
4-Methyl-2-pentanone	10000		R	R	R	R	R	R
Acetone	10000		R	R	R	R	R	R
Acrylonitrile								
Benzene	200	0.2	0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Bromobenzene			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Bromochloromethane			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Bromodichloromethane	92		0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Bromoform	720		0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Bromomethane	2900		0.132 U	0.135 U	0.141 U	0.0886 U	0.152 U	0.0973 U
Butane, 2-methoxy-2-methyl-			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Carbon disulfide			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Carbon tetrachloride	44	0.4	0.066 UJ	0.0677 UJ	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Chlorobenzene	10000	3.2	0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Chlorodibromomethane	68		0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U

APPENDIX J-1
SOIL ANALYTICAL RESULTS 2006-2007
SITE 04 - PDA

param_name	Industrial/ Commercial DEC (ppm)	GA Leachability (ppm)	SS-15 RI22-SSS1501 5/10/2007 1-2 ft	SS-16 RI22-SSS1600 5/10/2007 0-1 ft	SS-17 RI22-SSS1701 5/11/2007 1-2 ft	SS-18 RI22-SSS1800 5/11/2007 0-1 ft	SS-19 RI22-SSS1901 5/11/2007 1-2 ft	SS-20 RI22-SSS2000 5/11/2007 0-1 ft
Chloroethane			R	R	R	R	R	R
Chloroform	940		0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Chloromethane			0.132 U	0.135 U	0.141 U	0.0886 U	0.152 U	0.0973 U
Cis-1,2-Dichloroethene	10000	1.7	0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
cis-1,3-Dichloropropene			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Dibromomethane			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Dichlorodifluoromethane			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Diethyl ether			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Diisopropylether			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Ethyl benzene	10000	27	0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Ethyl-t-Butyl Ether			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Hexachlorobutadiene	73		0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Isopropylbenzene	10000		0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Methyl Tertbutyl Ether	10000	0.9	0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Methylene chloride	760		0.33 U	0.338 U	0.352 U	0.222 U	0.381 U	0.243 U
Naphthalene	10000	**0.8**	0.316	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
n-Butylbenzene			0.066 UJ	0.0677 UJ	0.0704 U	0.0443 U	0.0762 U	0.0487 U
o-Xylene			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Propionitrile								
Propylbenzene			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
sec-Butylbenzene			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Styrene	190	2.9	0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
t-Butyl alcohol								
tert-Butylbenzene			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Tetrachloroethene	110	0.1	0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Tetrahydrofuran			R	R	R	R	R	R
Toluene	10000	32	0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
trans-1,2-Dichloroethene	10000	3.3	0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
trans-1,3-Dichloropropene			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
trans-1,4-Dichloro-2-butene								
Trichloroethene	520	0.2	0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Trichlorofluoromethane			0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Vinyl acetate			0.33 U	0.338 U	0.352 U	0.222 U	0.381 U	0.243 U
Vinyl chloride	3	0.3	0.066 U	0.0677 U	0.0704 U	0.0443 U	0.0762 U	0.0487 U
Xylene, m/p			0.132 U	0.135 U	0.141 U	0.0886 U	0.152 U	0.0973 U
Xylenes, Total	10000	540	0.198 U	0.203 U	0.211 U	0.133 U	0.228 U	0.146 U
Inorganics (mg/Kg)								
Lead	500							
Percent Solids **(%)**								

APPENDIX J-1
SOIL ANALYTICAL RESULTS 2006-2007
SITE 04 - PDA

param_name	Industrial/ Commercial DEC (ppm)	GA Leachability (ppm)	SS-15 RI22-SSS1501 5/10/2007 1-2 ft	SS-16 RI22-SSS1600 5/10/2007 0-1 ft	SS-17 RI22-SSS1701 5/11/2007 1-2 ft	SS-18 RI22-SSS1800 5/11/2007 0-1 ft	SS-19 RI22-SSS1901 5/11/2007 1-2 ft	SS-20 RI22-SSS2000 5/11/2007 0-1 ft
TPH (mg/Kg)								
Diesel Range Organics			1170	90	46.4 U	38.7 U	47.7 U	40.8 U
Gasoline Range Organics			6.02 J	7.06	1.83 U	1.15 U	2.22 U	1.92
VPH (mg/Kg)								
Benzene	200	0.2						
Ethyl benzene	10000	27						
Methyl Tertbutyl Ether	10000	0.9						
Naphthalene	10000	**0.8**						
o-Xylene								
Toluene	10000	32						
Xylene, m/p								
C5-C8 Aliphatics								
C5-C8 Aliphatics (unadj.)								
C9-C10 Aromatics (unadj.)								
C9-C12 Aliphatics								
C9-C12 Aliphatics (unadj.)								
EPH (mg/Kg)								
2-Methylnaphthalene	10000							
Acenaphthene	10000							
Acenaphthylene	10000							
Anthracene	10000							
Benzo(a)anthracene	7.8							
Benzo(a)pyrene	0.8	240						
Benzo(b)fluoranthene	7.8							
Benzo(ghi)perylene	10000							
Benzo(k)fluoranthene	78							
Chrysene	780							
Dibenz(a,h)anthracene	0.8							
Fluoranthene	10000							
Fluorene	10000							
Indeno(1,2,3-cd)pyrene	7.8							
Naphthalene	10000	**0.8**						
Phenanthrene	10000							
Pyrene	10000							
C11-C22 Aromatics								
C11-C22 Aromatics (unadj.)								
C19-C36 Aliphatics								
C9-C18 Aliphatics								

NOTES:
DEC - direct exposure criteria
ft - feet (below ground surface)
GA - GA classified aquifer
J - result is estimated
MG/KG - milligrams per kilogram
MG/L - milligrams per liter
R - rejected result
RIDEM - Rhode Island Dept. of Environmental Management
U - not detected

APPENDIX J-2
GROUNDWATER ANALYTICAL RESULTS 2006-2007
SITE 04 - PDA

param.name	RIDEM GA GO (mg/L)	GP-01 RI 22 GPS 0101 5/8/2007 2.5-7.5 ft	GP-01 RI22-GPS0114 5/17/2007 14-16 ft	GP-02 RI 22 GPS 0201 5/8/2007 3.7-7.7 ft	GP-02 RI22-GPS0214 5/17/2007 14-16 ft	GP-03 RI22-GPS0301 5/9/2007 3.1-5 ft	GP-04 RI22-GPS0401 5/9/2007 5.7-7.2 ft	GP-05 RI 22 GPS 0501 5/8/2007 4-8 ft	GP-06 RI 22 GPS 0601 5/8/2007 3.6-7.2 ft	GP-07 RI22-GPS0701 5/9/2007 4.5-8.7 ft
Volatile Organics by 8011 (mg/L)										
1,2-Dibromo-3-chloropropane	0.0002									
1,2-Dibromoethane	0.00005									
Volatile Organics (mg/L)										
1,1,1,2-Tetrachloroethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1,1-Trichloroethane	0.2	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1,2,2-Tetrachloroethane		0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
1,1,2-Trichloro-1,2,2-Trifluoroethane										
1,1,2-Trichloroethane	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1-Dichloroethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1-Dichloroethene	0.007	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1-Dichloropropene		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
1,2,3-Trichlorobenzene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2,3-Trichloropropane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2,4-Trichlorobenzene	0.07	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2,4-Trimethylbenzene		0.001 U	0.001 U	0.001 U	0.0356	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dibromo-3-chloropropane	0.0002	0.005 U	0.005 U	0.005 UJ	0.005 U	0.005 UJ	0.005 UJ	0.005 UJ	0.005 UJ	0.005 U
1,2-Dibromoethane	0.00005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichlorobenzene	0.6	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichloroethane	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichloropropane	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,3,5-Trimethylbenzene		0.001 U	0.001 U	0.001 U	0.0089	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,3-Dichlorobenzene	0.6	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,3-Dichloropropane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,4-Dichlorobenzene	0.075	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,4-Dioxane		R	R	R	R	R	R	R	R	R
1-Chlorohexane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
2,2-Dichloropropane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
2-Butanone		R	R	R	R	R	R	R	R	R
2-Chlorotoluene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
2-Hexanone		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
4-Chlorotoluene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
4-iso-Propyltoluene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
4-Methyl-2-pentanone		0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Acetone		R	R	R	R	R	R	R	R	R
Acrylonitrile										
Benzene	**0.005**	0.0019	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Bromobenzene		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Bromochloromethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Bromodichloromethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Bromoform		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Bromomethane		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Butane, 2-methoxy-2-methyl-		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Carbon disulfide		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Carbon tetrachloride	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chlorobenzene	0.1	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chlorodibromomethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U

APPENDIX J-2
GROUNDWATER ANALYTICAL RESULTS 2006-2007
SITE 04 - PDA

		GP-01	GP-01	GP-02	GP-02	GP-03	GP-04	GP-05	GP-06	GP-07
param.name	RIDEM GA GO (mg/L)	RI 22 GPS 0101 5/8/2007 2.5-7.5 ft	RI22-GPS0114 5/17/2007 14-16 ft	RI 22 GPS 0201 5/8/2007 3.7-7.7 ft	RI22-GPS0214 5/17/2007 14-16 ft	RI22-GPS0301 5/9/2007 3.1-5 ft	RI22-GPS0401 5/9/2007 5.7-7.2 ft	RI 22 GPS 0501 5/8/2007 4-8 ft	RI 22 GPS 0601 5/8/2007 3.6-7.2 ft	RI22-GPS0701 5/9/2007 4.5-8.7 ft
Chloroethane		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Chloroform		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chloromethane		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Cis-1,2-Dichloroethene	0.07	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
cis-1,3-Dichloropropene		0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
Dibromomethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Dichlorodifluoromethane		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Diethyl ether		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Diisopropylether		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Ethyl benzene	0.7	0.001 U	0.001 U	0.001 U	0.0083	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Ethyl-t-Butyl Ether		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Hexachlorobutadiene		0.0006 U	0.0006 U	0.0006 U	0.0006 U	0.0006 U	0.0006 U	0.0006 U	0.0006 U	0.0006 U
Isopropylbenzene		0.001 U	0.001 U	0.001 U	0.001	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Methyl Tertbutyl Ether	0.04	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Methylene chloride	0.005	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Naphthalene	**0.02**	0.001 U	0.001 U	0.001 U	0.0266	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
n-Butylbenzene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
o-Xylene		0.001 U	0.001 U	0.001 U	0.0129	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Propionitrile										
Propylbenzene		0.001 U	0.001 U	0.001 U	0.0041	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
p-Xylene										
sec-Butylbenzene		0.001 U	0.001 U	0.001 U	0.0017	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Styrene	0.1	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
t-Butyl alcohol										
tert-Butylbenzene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Tetrachloroethene	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Tetrahydrofuran		0.005 U	R	R	R	R	R	R	R	R
Toluene	1	0.001 U	0.001 U	0.001 U	0.0179	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Total Trihalomethane		0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U
trans-1,2-Dichloroethene	0.1	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
trans-1,3-Dichloropropene		0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
trans-1,4-Dichloro-2-butene										
Trichloroethene	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Trichlorofluoromethane		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Vinyl acetate		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Vinyl chloride	0.002	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Xylene, m/p		0.002 U	0.002 U	0.002 U	0.0302	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Xylenes, Total	10	0.003 U	0.003 U	0.003 U	0.0431	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U
Metals, Total (mg/L)										
Lead	**0.015**			0.01 U		0.011	0.024	0.018	0.01 U	0.014
Metals, Dissolved (mg/L)										
Lead	**0.015**	0.01 U		0.01 U		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U

APPENDIX J-2
GROUNDWATER ANALYTICAL RESULTS 2006-2007
SITE 04 - PDA

		SS-01	SS-02	SS-03	SS-04	SS-05	SS-06	SS-07	SS-08	SS-09
param.name	RIDEM GA GO (mg/L)	RI22-GWS0101 1/19/2006 1-4 ft	RI22-GWS0201 1/18/2006 1-4 ft	RI22-GWS0301 1/18/2006 0.3-4 ft	RI22-GWS0401 1/19/2006 2-4 ft	RI22-GWS0501 1/19/2006 0.6-4 ft	RI22-GWS0601 1/19/2006 1.8-4 ft	RI22-GWS0701 1/19/2006 0.4-4 ft	RI22-GWS0801 1/20/2006 3.5-4 ft	RI22-GWS0901 1/26/2006 2-12 ft
Volatile Organics by 8011 (mg/L)										
1,2-Dibromo-3-chloropropane	0.0002	0.0000401 U	0.0000403 U	0.0000407 U	0.0000391 U	0.0000426 U	0.0000411 U	0.0000428 U	0.0000404 U	0.0000407 U
1,2-Dibromoethane	0.00005	0.0000201 U	0.0000201 U	0.0000203 U	0.0000196 U	0.0000213 U	0.0000206 U	0.0000214 U	0.0000202 U	0.0000203 U
Volatile Organics (mg/L)										
1,1,1,2-Tetrachloroethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1,1-Trichloroethane	0.2	0.001 UJ	0.001 UJ	0.001 U	0.001 UJ	0.001 UJ	0.001 UJ	0.001 UJ	0.001 UJ	0.001 U
1,1,2,2-Tetrachloroethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1,2-Trichloro-1,2,2-Trifluoroethane		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
1,1,2-Trichloroethane	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1-Dichloroethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.000403 J	0.001 U	0.0204	0.00382
1,1-Dichloroethene	0.007	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1-Dichloropropene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2,3-Trichlorobenzene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2,3-Trichloropropane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2,4-Trichlorobenzene	0.07	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2,4-Trimethylbenzene		0.0562	0.00184	0.0972	0.0519	0.241	0.394	0.109	0.533	0.27
1,2-Dibromo-3-chloropropane	0.0002	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
1,2-Dibromoethane	0.00005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichlorobenzene	0.6	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.000187 J	0.001 U
1,2-Dichloroethane	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.000396 J
1,2-Dichloropropane	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,3,5-Trimethylbenzene		0.0221	0.001 U	0.0258	0.0163	0.137	0.112	0.0535	0.149	0.124
1,3-Dichlorobenzene	0.6	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,3-Dichloropropane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,4-Dichlorobenzene	0.075	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,4-Dioxane		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 UJ
1-Chlorohexane										
2,2-Dichloropropane		0.001 UJ	0.001 UJ	0.001 U	0.001 UJ	0.001 UJ	0.001 UJ	0.001 UJ	0.001 UJ	0.001 U
2-Butanone		0.00393 J	0.01 U	0.01 U	0.01 U	0.01 U	0.0049 J	0.01 U	0.0081 J	R
2-Chlorotoluene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
2-Hexanone		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
4-Chlorotoluene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
4-iso-Propyltoluene		0.00318	0.001 U	0.00428	0.00133	0.017	0.00823	0.00801	0.0129	0.0139
4-Methyl-2-pentanone		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	R
Acetone		0.0174 J	R	R	0.00967 J	0.00449 J	0.0174 J	0.0082 J	0.0311 J	0.0145 J
Acrylonitrile		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Benzene	**0.005**	0.00541	0.001 U	0.001 U	0.00115	0.000398 J	0.0049	0.000144 J	0.00821	0.00491
Bromobenzene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Bromochloromethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Bromodichloromethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Bromoform		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Bromomethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Butane, 2-methoxy-2-methyl-		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Carbon disulfide		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Carbon tetrachloride	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chlorobenzene	0.1	0.001 U	0.001 U	0.001 U	0.001 U	0.000161 J	0.00026 J	0.001 U	0.001 U	0.001 U
Chlorodibromomethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U

APPENDIX J-2
GROUNDWATER ANALYTICAL RESULTS 2006-2007
SITE 04 - PDA

		SS-01	SS-02	SS-03	SS-04	SS-05	SS-06	SS-07	SS-08	SS-09
param.name	RIDEM GA GO (mg/L)	RI22-GWS0101 1/19/2006 1-4 ft	RI22-GWS0201 1/18/2006 1-4 ft	RI22-GWS0301 1/18/2006 0.3-4 ft	RI22-GWS0401 1/19/2006 2-4 ft	RI22-GWS0501 1/19/2006 0.6-4 ft	RI22-GWS0601 1/19/2006 1.8-4 ft	RI22-GWS0701 1/19/2006 0.4-4 ft	RI22-GWS0801 1/20/2006 3.5-4 ft	RI22-GWS0901 1/26/2006 2-12 ft
Chloroethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.000692 J	0.001 U	0.0173	0.00212
Chloroform		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chloromethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Cis-1,2-Dichloroethene	0.07	0.000332 J	0.001 U	0.001 U	0.001 U	0.000593 J	0.00151	0.00109	0.00514	0.00183
cis-1,3-Dichloropropene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Dibromomethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Dichlorodifluoromethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Diethyl ether		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Diisopropylether		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Ethyl benzene	0.7	0.0262	0.001 U	0.00074 J	0.000807 J	0.00161	0.00175	0.000778 J	0.103	0.0104
Ethyl-t-Butyl Ether		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Hexachlorobutadiene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Isopropylbenzene		0.00288	0.001 U	0.00249	0.00409	0.015	0.0127	0.00287	0.0243	0.0094
Methyl Tertbutyl Ether	0.04	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Methylene chloride	0.005	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Naphthalene	**0.02**	0.031	0.001 U	0.0028	0.001 U	0.00866	0.0023	0.0225	0.159	0.0607
n-Butylbenzene		0.00343	0.001 U	0.00498	0.000728 J	0.0144	0.00543	0.0116	0.0192	0.019
o-Xylene		0.0213	0.001 U	0.00186	0.001 U	0.0217	0.00391	0.00254	0.161	0.025
Propionitrile		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Propylbenzene		0.00558	0.001 U	0.00672	0.00441	0.0329	0.0183	0.00778	0.0476	0.0237
p-Xylene										
sec-Butylbenzene		0.00124	0.001 U	0.00274	0.0012	0.00911	0.00433	0.00308	0.00772	0.00616
Styrene	0.1	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
t-Butyl alcohol		0.1 U	0.0582 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 UJ
tert-Butylbenzene		0.001 U	0.001 U	0.001 U	0.000558 J	0.00216	0.00138	0.00101	0.00192	0.00212
Tetrachloroethene	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Tetrahydrofuran		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ
Toluene	1	0.00414	0.001 U	0.001 U	0.001 U	0.00124	0.000991 J	0.000566 J	0.127	0.015
Total Trihalomethane										
trans-1,2-Dichloroethene	0.1	0.000366 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.000732 J	0.001 U
trans-1,3-Dichloropropene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
trans-1,4-Dichloro-2-butene		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Trichloroethene	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Trichlorofluoromethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Vinyl acetate										
Vinyl chloride	0.002	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.000252 J	0.001 U	0.00142	0.001 U
Xylene, m/p		0.0721	0.001 U	0.00346	0.0013	0.00666	0.00902	0.00373	0.344	0.0408
Xylenes, Total	10									
Metals, Total (mg/L)										
Lead	**0.015**	2.26	0.194	0.335	1.27	1.18	0.824	1.05	0.176	0.142 J
Metals, Dissolved (mg/L)										
Lead	**0.015**	0.00682	0.00276	0.0585	0.00468	0.0171	0.116	0.00339	0.00807	0.00874

APPENDIX J-2
GROUNDWATER ANALYTICAL RESULTS 2006-2007
SITE 04 - PDA

param.name	RIDEM GA GO (mg/L)	SS-10 RI22-GWS1001 1/26/2006 1-4 ft	MW-1 RI22-GWSMW101 1/27/2006 10-20 ft	MW-1 RI22-GWSMW102 6/26/2007 6-16 ft	MW-2 RI22-GWSMW201 1/30/2006 6-16 ft	MW-2 RI22-GWSMW202 6/26/2007 6-16 ft	MW-8 RI22-GWSMW801 1/30/2006 6-16 ft	MW-8 RI22-GWSMW802 6/27/2007 6-16 ft	MW-14 RI22-GWSMW1401 1/30/2006 2-12 ft	MW-14 RI22-GWSMW1402 6/27/2007 2-12 ft
Volatile Organics by 8011 (mg/L)										
1,2-Dibromo-3-chloropropane	0.0002	0.0000423 U	0.0000408 U		0.0000417 U		0.0000431 U		0.000044 U	
1,2-Dibromoethane	0.00005	0.0000212 U	0.0000204 U		0.0000209 U		0.0000216 U		0.000022 U	
Volatile Organics (mg/L)										
1,1,1,2-Tetrachloroethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1,1-Trichloroethane	0.2	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1,2,2-Tetrachloroethane		0.001 U	0.001 U	0.0005 U	0.001 U	0.0005 U	0.001 U	0.0005 U	0.001 U	0.0005 U
1,1,2-Trichloro-1,2,2-Trifluoroethane		0.005 U	0.005 U		0.005 U		0.005 U		0.005 U	
1,1,2-Trichloroethane	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1-Dichloroethane		0.000846 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1-Dichloroethene	0.007	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1-Dichloropropene		0.001 U	0.001 U	0.002 U	0.001 U	0.002 U	0.001 U	0.002 U	0.001 U	0.002 U
1,2,3-Trichlorobenzene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2,3-Trichloropropane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2,4-Trichlorobenzene	0.07	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2,4-Trimethylbenzene		0.352	0.001 U	0.001 U	0.001 U	0.001 U	0.00124	0.0016	0.0326	0.0034
1,2-Dibromo-3-chloropropane	0.0002	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
1,2-Dibromoethane	0.00005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichlorobenzene	0.6	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichloroethane	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 UJ
1,2-Dichloropropane	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,3,5-Trimethylbenzene		0.196	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0018	0.0101	0.004
1,3-Dichlorobenzene	0.6	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,3-Dichloropropane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001
1,4-Dichlorobenzene	0.075	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,4-Dioxane		0.1 UJ	0.1 UJ	R	0.1 UJ	R	0.1 UJ	R	0.1 UJ	R
1-Chlorohexane				0.001 U		0.001 U		0.001 U		0.001 U
2,2-Dichloropropane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
2-Butanone		0.00702 J	R	R	0.01 U	R	0.01 U	R	0.01 U	R
2-Chlorotoluene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
2-Hexanone		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
4-Chlorotoluene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
4-iso-Propyltoluene		0.0223	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00118	0.001 U
4-Methyl-2-pentanone		R	R	0.025 U	R	0.025 U	R	0.025 U	R	0.025 U
Acetone		0.0363 J	R	R	0.00331 J	R	0.00432 J	R	0.00318 J	R
Acrylonitrile		0.1 U	0.1 U		R		R		R	
Benzene	**0.005**	0.0013	0.001 U	0.001 U	0.001 U	0.001 U	0.318	0.531	0.02	0.202
Bromobenzene		0.001 U	0.001 U	0.002 U	0.001 U	0.002 U	0.001 U	0.002 U	0.001 U	0.002 U
Bromochloromethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Bromodichloromethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Bromoform		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Bromomethane		0.001 U	0.001 U	0.002 U	0.001 U	0.002 U	0.001 U	0.002 U	0.001 U	0.002 U
Butane, 2-methoxy-2-methyl-		0.01 U	0.01 U	0.001 U	0.01 U	0.001 U	0.01 U	0.001 U	0.01 U	0.001 U
Carbon disulfide		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Carbon tetrachloride	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chlorobenzene	0.1	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chlorodibromomethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U

APPENDIX J-2
GROUNDWATER ANALYTICAL RESULTS 2006-2007
SITE 04 - PDA

param.name	RIDEM GA GO (mg/L)	SS-10 RI22-GWS1001 1/26/2006 1-4 ft	MW-1 RI22-GWSMW101 1/27/2006 10-20 ft	MW-1 RI22-GWSMW102 6/26/2007 6-16 ft	MW-2 RI22-GWSMW201 1/30/2006 6-16 ft	MW-2 RI22-GWSMW202 6/26/2007 6-16 ft	MW-8 RI22-GWSMW801 1/30/2006 6-16 ft	MW-8 RI22-GWSMW802 6/27/2007 6-16 ft	MW-14 RI22-GWSMW1401 1/30/2006 2-12 ft	MW-14 RI22-GWSMW1402 6/27/2007 2-12 ft
Chloroethane		0.00175	0.001 U	0.002 U	0.001 U	0.002 U	0.001 U	0.002 U	0.001 U	0.002 U
Chloroform		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chloromethane		0.001 U	0.001 U	0.002 UJ	0.001 U	0.002 UJ	0.001 U	0.002 U	0.001 U	0.002 UJ
Cis-1,2-Dichloroethene	0.07	0.00163	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
cis-1,3-Dichloropropene		0.001 U	0.001 U	0.0005 U	0.001 U	0.0005 U	0.001 U	0.0005 U	0.001 U	0.0005 U
Dibromomethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Dichlorodifluoromethane		0.001 U	0.001 U	0.002 U	0.001 U	0.002 UJ	0.001 U	0.002 U	0.001 U	0.002 U
Diethyl ether		0.01 U	0.01 U	0.001 U	0.01 U	0.001 U	0.01 U	0.001 U	0.01 U	0.001 U
Diisopropylether		0.01 U	0.01 U	0.001 U	0.01 U	0.001 U	0.01 U	0.001 U	0.01 U	0.001 U
Ethyl benzene	0.7	0.00942	0.001 U	0.001 U	0.001 U	0.001 U	0.00774	0.0265	0.0162	0.0746
Ethyl-t-Butyl Ether		0.01 U	0.01 U	0.001 U	0.01 U	0.001 U	0.01 U	0.001 U	0.01 U	0.001 U
Hexachlorobutadiene		0.001 U	0.001 U	0.0006 U	0.001 U	0.0006 U	0.001 U	0.0006 U	0.001 U	0.0006 U
Isopropylbenzene		0.00999	0.001 U	0.001 U	0.001 U	0.001 U	0.000447 J	0.0018	0.00209	0.004
Methyl Tertbutyl Ether	0.04	0.005 U	0.005 U	0.001 U	0.005 U	0.001 U	0.005 U	0.001 U	0.005 U	0.001 U
Methylene chloride	0.005	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Naphthalene	**0.02**	0.104	0.001 U	0.001 U	0.001 U	0.001 U	0.00104	0.0042	0.0162	0.0046
n-Butylbenzene		0.0306	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00233	0.001 U
o-Xylene		0.0301	0.001 U	0.001 U	0.001 U	0.001 U	0.00194	0.009	0.00947	0.0175
Propionitrile		0.005 U	0.005 U		0.005 U		0.005 U		0.005 U	
Propylbenzene		0.0238	0.001 U	0.001 U	0.001 U	0.001 U	0.000586 J	0.0033	0.00382	0.0107
p-Xylene				0.002 U		0.002 U		0.0695		0.0785
sec-Butylbenzene		0.0084	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00158	0.001 U
Styrene	0.1	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
t-Butyl alcohol		0.1 UJ	0.1 UJ		0.1 UJ		0.1 UJ		0.1 UJ	
tert-Butylbenzene		0.00387	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.000305 J	0.001 U
Tetrachloroethene	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Tetrahydrofuran		0.05 UJ	0.05 UJ	R	0.05 U	R	0.05 U	R	0.05 U	R
Toluene	1	0.00611	0.001 U	0.001 U	0.001 U	0.001 U	0.00283	0.0159	0.000927 J	0.0958
Total Trihalomethane				0.004 U		0.004 U		0.004 U		0.004 U
trans-1,2-Dichloroethene	0.1	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
trans-1,3-Dichloropropene		0.001 U	0.001 U	0.0005 U	0.001 U	0.0005 U	0.001 U	0.0005 U	0.001 U	0.0005 U
trans-1,4-Dichloro-2-butene		0.01 U	0.01 U		0.01 U		0.01 U		0.01 U	
Trichloroethene	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Trichlorofluoromethane		0.001 U	0.001 U	0.002 U	0.001 U	0.002 U	0.001 U	0.002 U	0.001 U	0.002 U
Vinyl acetate				0.005 U		0.005 U		0.005 U		0.005 U
Vinyl chloride	0.002	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Xylene, m/p		0.0359	0.001 U		0.001 U		0.00776		0.0391	
Xylenes, Total	10			0.003 U		0.003 U		0.0785		0.096
Metals, Total (mg/L)										
Lead	**0.015**	0.924 J	0.000429 J		0.0059 J		0.00201 J		0.0173 J	
Metals, Dissolved (mg/L)										
Lead	**0.015**	0.00817 J	0.001 U		0.000397 J		0.001 U		0.001 U	

APPENDIX J-2
GROUNDWATER ANALYTICAL RESULTS 2006-2007
SITE 04 - PDA

param.name	RIDEM GA GO (mg/L)	MW-14D RI22-MWS14D01 5/18/2007 10-20 ft	MW-14D RI23-GWSMW14D02 6/26/2007 10-20 ft	MW-15 RI22-GWSMW1501 1/30/2006 2-12 ft	MW-15 RI23-GWSMW1502 6/26/2007 2-12 ft	MW-15D RI23-GWSMW15D02 6/25/2007 10.2-15.2 ft	MW-20 RI22-GWSM2002 6/26/2007 2-12 ft	MW-20D RI22-MWS20D01 5/31/2007 10-20 ft	MW-20D RI23-GWSMW20D02 6/26/2007 10-20 ft	MW-21 RI22-GWSMW2102 6/26/2007 2-12 ft
Volatile Organics by 8011 (mg/L)										
1,2-Dibromo-3-chloropropane	0.0002			0.0000431 U						
1,2-Dibromoethane	0.00005			0.0000215 U						
Volatile Organics (mg/L)										
1,1,1,2-Tetrachloroethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1,1-Trichloroethane	0.2	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1,2,2-Tetrachloroethane		0.0005 U	0.0005 U	0.001 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
1,1,2-Trichloro-1,2,2-Trifluoroethane				0.005 U						
1,1,2-Trichloroethane	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1-Dichloroethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1-Dichloroethene	0.007	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,1-Dichloropropene		0.002 U	0.002 U	0.001 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
1,2,3-Trichlorobenzene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 UJ	0.001 U
1,2,3-Trichloropropane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2,4-Trichlorobenzene	0.07	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2,4-Trimethylbenzene		0.0616	0.0035	0.00974	0.0017	0.0315	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dibromo-3-chloropropane	0.0002	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 UJ	0.005 U	0.005 U
1,2-Dibromoethane	0.00005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichlorobenzene	0.6	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichloroethane	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 UJ	0.001 UJ
1,2-Dichloropropane	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,3,5-Trimethylbenzene		0.0141	0.0047	0.00392	0.001 U	0.0093	0.001 U	0.001 U	0.001 U	0.0031
1,3-Dichlorobenzene	0.6	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,3-Dichloropropane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,4-Dichlorobenzene	0.075	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1,4-Dioxane		R	R	0.1 UJ	R	R	R	R	R	R
1-Chlorohexane		0.001 U	0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
2,2-Dichloropropane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
2-Butanone		R	R	0.01 U	R	R	R	R	R	R
2-Chlorotoluene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
2-Hexanone		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
4-Chlorotoluene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
4-iso-Propyltoluene		0.001 U	0.001 U	0.000667 J	0.001 U	0.0029	0.001 U	0.001 U	0.001 U	0.001 U
4-Methyl-2-pentanone		0.025 U	0.025 U	R	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Acetone		R	R	0.00328 J	R	R	R	R	R	R
Acrylonitrile				R						
Benzene	0.005	0.756	0.289	0.001 U	0.004	0.38	0.001 U	0.001 U	0.0127	0.0256
Bromobenzene		0.002 U	0.002 U	0.001 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Bromochloromethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Bromodichloromethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Bromoform		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Bromomethane		0.002 U	0.002 U	0.001 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Butane, 2-methoxy-2-methyl-		0.001 U	0.001 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Carbon disulfide		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Carbon tetrachloride	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chlorobenzene	0.1	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chlorodibromomethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U

APPENDIX J-2
GROUNDWATER ANALYTICAL RESULTS 2006-2007
SITE 04 - PDA

		MW-14D	MW-14D	MW-15	MW-15	MW-15D	MW-20	MW-20D	MW-20D	MW-21
param.name	RIDEM GA GO (mg/L)	RI22-MWS14D01 5/18/2007 10-20 ft	RI23-GWSMW14D02 6/26/2007 10-20 ft	RI22-GWSMW1501 1/30/2006 2-12 ft	RI23-GWSMW1502 6/26/2007 2-12 ft	RI23-GWSMW15D02 6/25/2007 10.2-15.2 ft	RI22-GWSM2002 6/26/2007 2-12 ft	RI22-MWS20D01 5/31/2007 10-20 ft	RI23-GWSMW20D02 6/26/2007 10-20 ft	RI22-GWSMW2102 6/26/2007 2-12 ft
Chloroethane		0.002 U	0.002 U	0.001 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Chloroform		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chloromethane		0.002 U	0.002 UJ	0.001 U	0.002 UJ	0.002 UJ	0.002 U	0.002 U	0.002 U	0.002 U
Cis-1,2-Dichloroethene	0.07	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
cis-1,3-Dichloropropene		0.0005 U	0.0005 U	0.001 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
Dibromomethane		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Dichlorodifluoromethane		0.002 U	0.002 U	0.001 U	0.002 UJ	0.002 UJ	0.002 U	0.002 U	0.002 U	0.002 U
Diethyl ether		0.001 U	0.001 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Diisopropylether		0.001 U	0.001 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Ethyl benzene	0.7	0.143	0.0848	0.00189	0.0016	0.102	0.001 U	0.001 U	0.001 U	0.001 U
Ethyl-t-Butyl Ether		0.001 U	0.001 U	0.01 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Hexachlorobutadiene		0.0006 U	0.0006 U	0.001 U	0.0006 U	0.0006 U	0.0006 U	0.0006 U	0.0006 U	0.0006 U
Isopropylbenzene		0.0055	0.0047	0.000656 J	0.001 U	0.0093	0.001 U	0.001 U	0.001 U	0.0031
Methyl Tertbutyl Ether	0.04	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Methylene chloride	0.005	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Naphthalene	**0.02**	0.0152	0.0312	0.00182	0.001 U	0.0304	0.001 U	0.001 U	0.001 UJ	0.001 U
n-Butylbenzene		0.001 U	0.001 U	0.00123	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
o-Xylene		0.0132	0.017	0.00206	0.0019	0.0845	0.001 U	0.001 U	0.001 U	0.001 U
Propionitrile				0.005 U						
Propylbenzene		0.0142	0.013	0.00154	0.001	0.0189	0.001 U	0.001 U	0.001 U	0.0025
p-Xylene			0.0739		0.0036	0.132	0.002 U	0.002 U	0.002 U	0.002 U
sec-Butylbenzene		0.001 U	0.001 U	0.000482 J	0.001 U	0.0026	0.001 U	0.001 U	0.001 U	0.002
Styrene	0.1	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
t-Butyl alcohol				0.1 UJ						
tert-Butylbenzene		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Tetrachloroethene	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Tetrahydrofuran		R	R	0.05 U	R	R	R	R	R	R
Toluene	1	0.0562	0.132	0.000368 J	0.001 U	0.0805	0.001 U	0.001 U	0.001 U	0.001 U
Total Trihalomethane		0.004 U	0.004 U		0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U
trans-1,2-Dichloroethene	0.1	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
trans-1,3-Dichloropropene		0.0005 U	0.0005 U	0.001 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
trans-1,4-Dichloro-2-butene				0.01 U						
Trichloroethene	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Trichlorofluoromethane		0.002 U	0.002 U	0.001 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Vinyl acetate		0.005 U	0.005 U		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Vinyl chloride	0.002	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Xylene, m/p		0.343		0.00618						
Xylenes, Total	10	0.356	0.0909		0.0055	0.216	0.003 U	0.003 U	0.003 U	0.003 U
Metals, Total (mg/L)										
Lead	**0.015**			0.151 J						
Metals, Dissolved (mg/L)										
Lead	**0.015**			0.0201						

APPENDIX J-2
GROUNDWATER ANALYTICAL RESULTS 2006-2007
SITE 04 - PDA

param.name	RIDEM GA GO (mg/L)	MW-21D RI23-GWSMW21D02 6/26/2007 12.5-17.5 ft	MW-22 RI23-GWSMW2202 6/27/2007 2-12 ft	MW-22D RI23-GWSMW22D02 6/27/2007 12-17 ft	MW-24D RI23-GWSMW24D02 6/27/2007 10-15 ft
Volatile Organics by 8011 (mg/L)					
1,2-Dibromo-3-chloropropane	0.0002				
1,2-Dibromoethane	0.00005				
Volatile Organics (mg/L)					
1,1,1,2-Tetrachloroethane		0.001 U	0.001 U	0.001 U	0.001 U
1,1,1-Trichloroethane	0.2	0.001 U	0.001 U	0.001 U	0.001 U
1,1,2,2-Tetrachloroethane		0.0005 U	0.0005 U	0.0005 U	0.0005 U
1,1,2-Trichloro-1,2,2-Trifluoroethane					
1,1,2-Trichloroethane	0.005	0.001 U	0.001 U	0.001 U	0.001 U
1,1-Dichloroethane		0.001 U	0.001 U	0.001 U	0.001 U
1,1-Dichloroethene	0.007	0.001 U	0.001 U	0.001 U	0.001 U
1,1-Dichloropropene		0.002 U	0.002 U	0.002 U	0.002 U
1,2,3-Trichlorobenzene		0.001 U	0.001 U	0.001 U	0.001 U
1,2,3-Trichloropropane		0.001 U	0.001 U	0.001 U	0.001 U
1,2,4-Trichlorobenzene	0.07	0.001 U	0.001 U	0.001 U	0.001 U
1,2,4-Trimethylbenzene		0.0032	0.001 U	0.001 U	0.001 U
1,2-Dibromo-3-chloropropane	0.0002	0.005 U	0.005 U	0.005 U	0.005 U
1,2-Dibromoethane	0.00005	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichlorobenzene	0.6	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichloroethane	0.005	0.001 UJ	0.001 U	0.001 U	0.001 U
1,2-Dichloropropane	0.005	0.001 U	0.001 U	0.001 U	0.001 U
1,3,5-Trimethylbenzene		0.0062	0.001 U	0.001 U	0.001 U
1,3-Dichlorobenzene	0.6	0.001 U	0.001 U	0.001 U	0.001 U
1,3-Dichloropropane		0.001 U	0.001 U	0.001 U	0.001 U
1,4-Dichlorobenzene	0.075	0.001 U	0.001 U	0.001 U	0.001 U
1,4-Dioxane		R	R	R	R
1-Chlorohexane		0.001 U	0.001 U	0.001 U	0.001 U
2,2-Dichloropropane		0.001 U	0.001 U	0.001 U	0.001 U
2-Butanone		R	R	R	R
2-Chlorotoluene		0.001 U	0.001 U	0.001 U	0.001 U
2-Hexanone		0.01 U	0.01 U	0.01 U	0.01 U
4-Chlorotoluene		0.001 U	0.001 U	0.001 U	0.001 U
4-iso-Propyltoluene		0.001 U	0.001 U	0.001 U	0.001 U
4-Methyl-2-pentanone		0.025 U	0.025 U	0.025 U	0.025 U
Acetone		R	R	R	R
Acrylonitrile					
Benzene	**0.005**	0.0954	0.0012	0.001 U	0.0094
Bromobenzene		0.002 U	0.002 U	0.002 U	0.002 U
Bromochloromethane		0.001 U	0.001 U	0.001 U	0.001 U
Bromodichloromethane		0.001 U	0.001 U	0.001 U	0.001 U
Bromoform		0.001 U	0.001 U	0.001 U	0.001 U
Bromomethane		0.002 U	0.002 U	0.002 U	0.002 U
Butane, 2-methoxy-2-methyl-		0.001 U	0.001 U	0.001 U	0.001 U
Carbon disulfide		0.001 U	0.001 U	0.001 U	0.001 U
Carbon tetrachloride	0.005	0.001 U	0.001 U	0.001 U	0.001 U
Chlorobenzene	0.1	0.001 U	0.001 U	0.001 U	0.001 U
Chlorodibromomethane		0.001 U	0.001 U	0.001 U	0.001 U

APPENDIX J-2
GROUNDWATER ANALYTICAL RESULTS 2006-2007
SITE 04 - PDA

param.name	RIDEM GA GO (mg/L)	MW-21D RI23-GWSMW21D02 6/26/2007 12.5-17.5 ft	MW-22 RI23-GWSMW2202 6/27/2007 2-12 ft	MW-22D RI23-GWSMW22D02 6/27/2007 12-17 ft	MW-24D RI23-GWSMW24D02 6/27/2007 10-15 ft
Chloroethane		0.002 U	0.002 U	0.002 U	0.002 U
Chloroform		0.001 U	0.001 U	0.001 U	0.001 U
Chloromethane		0.002 U	0.002 UJ	0.002 U	0.002 UJ
Cis-1,2-Dichloroethene	0.07	0.001 U	0.001 U	0.001 U	0.001 U
cis-1,3-Dichloropropene		0.0005 U	0.0005 U	0.0005 U	0.0005 U
Dibromomethane		0.001 U	0.001 U	0.001 U	0.001 U
Dichlorodifluoromethane		0.002 U	0.002 U	0.002 U	0.002 U
Diethyl ether		0.001 U	0.001 U	0.001 U	0.001 U
Diisopropylether		0.001 U	0.001 U	0.001 U	0.001 U
Ethyl benzene	0.7	0.001 U	0.001 U	0.001 U	0.001 U
Ethyl-t-Butyl Ether		0.001 U	0.001 U	0.001 U	0.001 U
Hexachlorobutadiene		0.0006 U	0.0006 U	0.0006 U	0.0006 U
Isopropylbenzene		0.0062	0.001 U	0.001 U	0.001 U
Methyl Tertbutyl Ether	0.04	0.001 U	0.001 U	0.001 U	0.001 U
Methylene chloride	0.005	0.005 U	0.005 U	0.005 U	0.005 U
Naphthalene	**0.02**	0.0014	0.001 U	0.001 U	0.001 U
n-Butylbenzene		0.0018	0.001 U	0.001 U	0.001 U
o-Xylene		0.001 U	0.001 U	0.001 U	0.001 U
Propionitrile					
Propylbenzene		0.008	0.001 U	0.001 U	0.001 U
p-Xylene		0.0038	0.002 U	0.002 U	0.001 U
sec-Butylbenzene		0.0027	0.001 U	0.001 U	0.001 U
Styrene	0.1	0.001 U	0.001 U	0.001 U	0.001 U
t-Butyl alcohol					
tert-Butylbenzene		0.001 U	0.001 U	0.001 U	0.001 U
Tetrachloroethene	0.005	0.001 U	0.001 U	0.001 U	0.001 U
Tetrahydrofuran		R	R	R	R
Toluene	1	0.0018	0.001 U	0.001 U	0.001 U
Total Trihalomethane		0.004 U	0.004 U	0.004 U	0.004 U
trans-1,2-Dichloroethene	0.1	0.001 U	0.001 U	0.001 U	0.001 U
trans-1,3-Dichloropropene		0.0005 U	0.0005 U	0.0005 U	0.0005 U
trans-1,4-Dichloro-2-butene					
Trichloroethene	0.005	0.001 U	0.001 U	0.001 U	0.001 U
Trichlorofluoromethane		0.002 U	0.002 U	0.002 U	0.002 U
Vinyl acetate		0.005 U	0.005 U	0.005 U	0.005 U
Vinyl chloride	0.002	0.001 U	0.001 U	0.001 U	0.001 U
Xylene, m/p					
Xylenes, Total	10	0.0038	0.003 U	0.003 U	0.003 U
Metals, Total (mg/L)					
Lead	**0.015**				
Metals, Dissolved (mg/L)					
Lead	**0.015**				

NOTES:
ft - feet (below ground surface)
GA - GA classified aquifer
GB - GB classified aquifer
GO - Groundwater Objectives
J - result is estimated
MG/L - milligrams per liter
R - rejected result
RIDEM - Rhode Island Dept. of Env. Mgmt.
U - not detected

APPENDIX K

RISK ASSESSMENT SUPPORTING INFORMATION

Particulate Emission Factor

CALCULATION OF THE PARTICULATE EMISSION FACTOR - SOIL TO AMBIENT AIR

EQUATIONS:

$$\text{PEF } (m^3/kg) = Q/C \times [(3600 \text{ s/hr}) / ((0.036 \times (1-V) \times (U_m/U_t)^3 \times F(x))]$$

PARAMETER/DEFINITION	UNITS	DEFAULT
PEF / particulate emission factor	m^3/kg	**1.16E+09** Calculated
Q/C / inverse of the mean concentration at the center of a 0.5-acre-square source	g/m^2-s per kg/m^3	71.35 USEPA, 1996 (value for Hartford, CT)
V / Fraction of vegetative cover	unitless	0.5 USEPA, 1996
U_m / mean annual windspeed	m/s	4.51 Annual for Worcester, MA (10.1 mi/hr)
U_t / equivalent threshold value of windspeed at 7 m	m/s	11.32 USEPA, 1996
x / calculated as 0.886 (Ut/Um)		2.22
F(x) / function dependant on U_m/U_t derived using Cowherd et al. (1985)	unitless	0.194 Cowherd et al. (1985) Figure 4-3

Source: USEPA, 1996. Soil Screening Guidance. EPA/540/R-95/128.

Volatilization Factor

TABLE
CALCULATION OF THE VOLATILIZATION FACTOR - SOIL TO AMBIENT AIR

EQUATIONS:

$$VF\ (m^3/kg) = Q/C \times (3.14 \times D_A \times T)^{1/2} \times 10^{-4}(m^2/cm^2) / (2 \times P_b \times D_A)$$

where

$$DA = [(O_a^{10/3} D_i H' + O_w^{10/3} D_w)/n^2] / P_b K_d + O_w + O_a H'$$

PARAMETER/DEFINITION	UNITS	DEFAULT
VF / volatilization factor	m^3/kg	Calculated
D_A / apparent diffusivity	cm^2/s	Calculated
Q/C / inverse of the mean concentration at the center of a 0.5-acre-square source	g/m^2-s per kg/m^3	71.35 USEPA, 1996 (value for Hartford, CT)
T / exposure interva	s	7.9E+08 25 yr C/I worker
Π_b / dry soil bulk density	g/cm^3	1.62 USEPA, 2002
O_a / air-filled soil porosity	L_{air}/L_{soil}	0.314 USEPA, 2002
n / total soil porosity	L_{pore}/L_{soil}	0.39 USEPA, 2002
O_w / water-filled soil porosity	L_{water}/L_{soil}	0.076 USEPA, 2002
Ψ_s / soil particle density	g/cm^3	2.65 USEPA, 1996
D_i / diffusivity in air	cm^2/s	chemical-specific
H' / Henry's Law constant	dimensionless	chemical-specific
D_w / diffusivity in water	cm^2/s	chemical-specific
K_d / soil-water partition coefficient (K_{oc} x f_{oc}) organics	cm^3/g	chemical-specific
K_{oc} / soil organic carbon partition coefficien	cm^3/g	chemical-specific
f_{oc} / fraction organic carbon in soil	g/g	0.006 Default

Source: USEPA, 1996. Soil Screening Guidance. EPA/540/R-95/128.
USEPA, 2002. Johnson and Ettinger Model; these parameter values are the same values used to represent overburden soil conditions in the groundwater to indor air vapor intrusion model for this site.

TABLE (CONT)
CALCULATION OF THE VOLATILIZATION FACTOR - SOIL TO AMBIENT AIR

CHEMICAL	D_i (cm^2/s)	H'	D_w (cm^2/s)	K_d (cm^3/g)	K_{oc} (cm^3/g)	D_A (cm^2/s)	VF (m^3/kg)
1,2,4-Trimethylbenzene	7.50E-02	2.34E-01	7.10E-06	2.23E+01	3.72E+03	6.68E-05	**13407**
1,3,5-Trimethylbenzene	7.50E-02	3.16E-01	7.10E-06	4.91E+00	8.19E+02	4.03E-04	**5457**
4-iso-Propyltoluene				0.00E+00		NA	
Naphthalene	5.90E-02	2.00E-02	7.90E-06	7.20E+00	1.20E+03	1.39E-05	**29390**
o-Xylene	7.00E-02	3.00E-01	7.80E-06	2.46E+00	4.10E+02	6.99E-04	**4144**
2-Methylnaphthalene	5.90E-02	2.00E-02	7.90E-06	7.20E+00	1.20E+03	1.39E-05	**29390**

Source of Di, H, Dw, and Koc values:
USEPA, 2004. USEPA Region IX PRG Table
Checked by: JHP

CALCULATION OF AMBIENT AIR CONCENTRATIONS FOR SOIL

COMPOUND	MEDIUM EPC (mg/kg)	VF-SOIL (m3/kg)	Ambient Air Conc. Soil [a] (mg/m3)
1,2,4-Trimethylbenzene	1.56E+02	1.34E+04	1.16E-02
1,3,5-Trimethylbenzene	1.74E+02	5.46E+03	3.19E-02
4-iso-Propyltoluene	3.07E+01		NA
Naphthalene	8.44E+00	2.94E+04	2.87E-04
o-Xylene	1.57E+01	4.14E+03	3.79E-03
2-Methylnaphthalene	4.68E+00	2.94E+04	1.59E-04

Notes:

NA= Not applicable/Not available

[a] Ambient air concentration (associated with soil) = Maximum Soil Concentration / VF-Soil

Checked by: JHP

Johnson-Ettinger Model (Vapor Intrusion)

DATA ENTRY SHEET

Table 1 Calculation of Indoor Air VOC Concentrations Resulting from Vapor Migration from Groundwater **1,2,4-Trimethylbenzene**

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95636	5.33E-01	1,2,4-Trimethylbenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
10	15	90	90			A	LS	LS		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
LS	1.62	0.390	0.076	C	1.43	0.459	0.215	C	1.43	0.459	0.215

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	305	0.1	1	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

Table 1 Calculation of Indoor Air VOC Concentrations Resulting from Vapor Migration from Groundwater **1,2,4-Trimethylbenzene**

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	75	0.314	0.244	0.244	0.079	1.62E-08	0.957	1.55E-08	18.75	0.39	0.087	0.303	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.47E+04	1.06E+06	3.77E-04	15	11,692	2.16E-03	9.30E-02	1.75E-04	8.42E-03	0.00E+00	0.00E+00	1.30E-04	4.95E-04	75

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.95E+01	0.10	1.56E+01	8.42E-03	4.00E+02	1.39E+20	5.70E-05	**2.83E-03**	NA	6.0E-03

END

DATA ENTRY SHEET

Table 2 Calculation of Indoor Air VOC Concentrations Resulting from Vapor Migration from Groundwater **1,3,5-Trimethylbenzene**

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108678	1.96E-01	1,3,5-Trimethylbenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
10	15	90	90			A	LS	LS		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
LS	1.62	0.390	0.076	C	1.43	0.459	0.215	C	1.43	0.459	0.215

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	305	0.1	1	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Table 2 Calculation of Indoor Air VOC Concentrations Resulting from Vapor Migration from Groundwater **1,3,5-Trimethylbenzene**

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	75	0.314	0.244	0.244	0.079	1.62E-08	0.957	1.55E-08	18.75	0.39	0.087	0.303	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.47E+04	1.06E+06	3.77E-04	15	11,678	2.07E-03	8.89E-02	1.75E-04	8.36E-03	0.00E+00	0.00E+00	1.30E-04	4.98E-04	75

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.74E+01	0.10	1.56E+01	8.36E-03	4.00E+02	1.89E+20	5.72E-05	**9.97E-04**	NA	6.0E-03

END

DATA ENTRY SHEET

Table 3 Calculation of Indoor Air VOC Concentrations Resulting from Vapor Migration from Groundwater **Benzene**

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
71432	2.02E-01	Benzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	15	90	90			A	LS	LS		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
LS	1.62	0.390	0.076	C	1.43	0.459	0.215	C	1.43	0.459	0.215

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	305	0.1	1	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

Table 3 Calculation of Indoor Air VOC Concentrations Resulting from Vapor Migration from Groundwater **Benzene**

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	75	0.314	0.244	0.244	0.079	1.62E-08	0.957	1.55E-08	18.75	0.39	0.087	0.303	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.47E+04	1.06E+06	3.77E-04	15	8,122	2.68E-03	1.15E-01	1.75E-04	1.22E-02	0.00E+00	0.00E+00	1.83E-04	7.02E-04	75

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.33E+01	0.10	1.56E+01	1.22E-02	4.00E+02	7.44E+13	7.16E-05	**1.67E-03**	7.8E-06	3.0E-02

END

DATA ENTRY SHEET

Table 4 Calculation of Indoor Air VOC Concentrations Resulting from Vapor Migration from Groundwater **Cumene**

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
98828	2.40E-02	Cumene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
10	15	90	90			A	LS	LS		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
LS	1.62	0.390	0.076	C	1.43	0.459	0.215	C	1.43	0.459	0.215

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	305	0.1	1	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Table 4 Calculation of Indoor Air VOC Concentrations Resulting from Vapor Migration from Groundwater **Cumene**

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	75	0.314	0.244	0.244	0.079	1.62E-08	0.957	1.55E-08	18.75	0.39	0.087	0.303	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.47E+04	1.06E+06	3.77E-04	15	12,644	4.71E-03	2.03E-01	1.75E-04	9.03E-03	0.00E+00	0.00E+00	1.32E-04	5.06E-04	75

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.87E+00	0.10	1.56E+01	9.03E-03	4.00E+02	6.03E+18	5.79E-05	**2.82E-04**	NA	4.0E-01

END

DATA ENTRY SHEET

Table 5 Calculation of Indoor Air VOC Concentrations Resulting from Vapor Migration from Groundwater **Naphthalene**

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
91203	1.59E-01	Naphthalene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	15	90	90			A	LS	LS		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
LS	1.62	0.390	0.076	C	1.43	0.459	0.215	C	1.43	0.459	0.215

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	305	0.1	1	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

Table 5 Calculation of Indoor Air VOC Concentrations Resulting from Vapor Migration from Groundwater **Naphthalene**

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	75	0.314	0.244	0.244	0.079	1.62E-08	0.957	1.55E-08	18.75	0.39	0.087	0.303	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.47E+04	1.06E+06	3.77E-04	15	12,913	1.52E-04	6.54E-03	1.75E-04	8.20E-03	0.00E+00	0.00E+00	2.57E-04	9.39E-04	75

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.04E+00	0.10	1.56E+01	8.20E-03	4.00E+02	4.86E+20	8.47E-05	**8.80E-05**	NA	3.0E-03

END

DATA ENTRY SHEET

Table 6 Calculation of Indoor Air VOC Concentrations Resulting from Vapor Migration from Groundwater **n-Butylbenzene**

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
104518	3.10E-02	n-Butylbenzene

MORE

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	15	90	90			A	LS	LS		

MORE

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
LS	1.62	0.390	0.076	C	1.43	0.459	0.215	C	1.43	0.459	0.215

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	305	0.1	1	

MORE

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

Table 6 Calculation of Indoor Air VOC Concentrations Resulting from Vapor Migration from Groundwater **n-Butylbenzene**

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	75	0.314	0.244	0.244	0.079	1.62E-08	0.957	1.55E-08	18.75	0.39	0.087	0.303	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.47E+04	1.06E+06	3.77E-04	15	11,847	4.55E-03	1.96E-01	1.75E-04	7.92E-03	0.00E+00	0.00E+00	1.17E-04	4.48E-04	75

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.07E+00	0.10	1.56E+01	7.92E-03	4.00E+02	2.61E+21	5.32E-05	**3.23E-04**	NA	1.4E-01

END

DATA ENTRY SHEET

Table 7 Calculation of Indoor Air VOC Concentrations Resulting from Vapor Migration from Groundwater **Propylbenzene**

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
103651	4.80E-02	n-Propylbenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	15	90	90			A	LS	LS		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
LS	1.62	0.390	0.076	C	1.43	0.459	0.215	C	1.43	0.459	0.215

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	305	0.1	1	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Table 7 Calculation of Indoor Air VOC Concentrations Resulting from Vapor Migration from Groundwater **Propylbenzene**

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	75	0.314	0.244	0.244	0.079	1.62E-08	0.957	1.55E-08	18.75	0.39	0.087	0.303	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.47E+04	1.06E+06	3.77E-04	15	11,368	3.86E-03	1.66E-01	1.75E-04	8.35E-03	0.00E+00	0.00E+00	1.24E-04	4.74E-04	75

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	7.97E+00	0.10	1.56E+01	8.35E-03	4.00E+02	2.05E+20	5.54E-05	**4.41E-04**	NA	1.4E-01

END

Pro UCL Calculations

1				General UCL Statistics for Data Sets with Non-Detects								
2	User Selected Options											
3	From File			C:\Documents and Settings\Jay\My Documents\Work\ProUCL-SO-Input-A.wst								
4	Full Precision			OFF								
5	Confidence Coefficient			95%								
6	Number of Bootstrap Operations			2000								
7												
8												
9	1,2,4-Trimethylbenzene											
10												
11	General Statistics											
12	Number of Valid Samples			21		Number of Detected Data						13
13	Number of Unique Samples			13		Number of Non-Detect Data						8
14						Percent Non-Detects						38.10%
15												
16	Raw Statistics					Log-transformed Statistics						
17	Minimum Detected			0.00134		Minimum Detected						-6.615
18	Maximum Detected			1030		Maximum Detected						6.937
19	Mean of Detected			92.68		Mean of Detected						1.129
20	SD of Detected			282.3		SD of Detected						3.598
21	Minimum Non-Detect			0.00599		Minimum Non-Detect						-5.118
22	Maximum Non-Detect			0.0783		Maximum Non-Detect						-2.547
23												
24	Note: Data have multiple DLs - Use of KM Method is recommended					Number treated as Non-Detect						9
25	For all methods (except KM, DL/2, and ROS Methods),					Number treated as Detected						12
26	Observations < Largest ND are treated as NDs					Single DL Non-Detect Percentage						42.86%
27												
28	UCL Statistics											
29	Normal Distribution Test with Detected Values Only					Lognormal Distribution Test with Detected Values Only						
30	Shapiro Wilk Test Statistic			0.362		Shapiro Wilk Test Statistic						0.929
31	5% Shapiro Wilk Critical Value			0.866		5% Shapiro Wilk Critical Value						0.866
32	Data not Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level						
33												
34	Assuming Normal Distribution					Assuming Lognormal Distribution						
35	DL/2 Substitution Method					DL/2 Substitution Method						
36	Mean			57.38		Mean						-0.728
37	SD			223.5		SD						3.729
38	95% DL/2 (t) UCL			141.5		95% H-Stat (DL/2) UCL						17185
39												
40	Maximum Likelihood Estimate(MLE) Method			N/A		Log ROS Method						
41	MLE yields a negative mean					Mean in Log Scale						-1.523
42						SD in Log Scale						4.446
43						Mean in Original Scale						57.37
44						SD in Original Scale						223.5
45						95% Percentile Bootstrap UCL						153
46						95% BCA Bootstrap UCL						206.1
47												
48	Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only						
49	k star (bias corrected)			0.216		Data appear Gamma Distributed at 5% Significance Level						
50	Theta Star			429.1								
51	nu star			5.616								
52												
53	A-D Test Statistic			0.73		Nonparametric Statistics						

54				5% A-D Critical Value	0.863					Kaplan-Meier (KM) Method		
55				K-S Test Statistic	0.863					Mean		57.37
56				5% K-S Critical Value	0.261					SD		218.1
57	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		49.53
58										95% KM (t) UCL		142.8
59	**Assuming Gamma Distribution**									95% KM (z) UCL		138.8
60				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL		141.4
61				Minimum	0					95% KM (bootstrap t) UCL		1006
62				Maximum	1030					95% KM (BCA) UCL		156.3
63				Mean	57.37					95% KM (Percentile Bootstrap) UCL		155.3
64				Median	0.0992					95% KM (Chebyshev) UCL		273.3
65				SD	223.5					97.5% KM (Chebyshev) UCL		366.7
66				k star	0.0958					99% KM (Chebyshev) UCL		550.2
67				Theta star	598.8							
68				Nu star	4.024					**Potential UCLs to Use**		
69				AppChi2	0.731					95% KM (BCA) UCL		156.3
70				95% Gamma Approximate UCL	315.7							
71				95% Adjusted Gamma UCL	364							
72	**Note: DL/2 is not a recommended method.**											
73												
74												
75	**1,3,5-Trimethylbenzene**											
76												
77							**General Statistics**					
78				Number of Valid Samples	21					Number of Detected Data		19
79				Number of Unique Samples	19					Number of Non-Detect Data		2
80										Percent Non-Detects		9.52%
81												
82				**Raw Statistics**						**Log-transformed Statistics**		
83				Minimum Detected	0.00453					Minimum Detected		-5.397
84				Maximum Detected	326					Maximum Detected		5.787
85				Mean of Detected	22.13					Mean of Detected		-0.455
86				SD of Detected	74.2					SD of Detected		3.044
87				Minimum Non-Detect	0.00533					Minimum Non-Detect		-5.234
88				Maximum Non-Detect	0.00599					Maximum Non-Detect		-5.118
89												
90	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		3
91	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		18
92	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		14.29%
93												
94							**UCL Statistics**					
95	**Normal Distribution Test with Detected Values Only**									**Lognormal Distribution Test with Detected Values Only**		
96				Shapiro Wilk Test Statistic	0.325					Shapiro Wilk Test Statistic		0.899
97				5% Shapiro Wilk Critical Value	0.901					5% Shapiro Wilk Critical Value		0.901
98	**Data not Normal at 5% Significance Level**									**Data not Lognormal at 5% Significance Level**		
99												
100	**Assuming Normal Distribution**									**Assuming Lognormal Distribution**		
101				DL/2 Substitution Method						DL/2 Substitution Method		
102				Mean	20.02					Mean		-0.97
103				SD	70.71					SD		3.315
104				95% DL/2 (t) UCL	46.63					95% H-Stat (DL/2) UCL		9737
105												
106				Maximum Likelihood Estimate(MLE) Method						Log ROS Method		

107					Mean	11.97					Mean in Log Scale	-1.007
108					SD	75.78					SD in Log Scale	3.373
109					95% MLE (t) UCL	40.5					Mean in Original Scale	20.02
110					95% MLE (Tiku) UCL	38.79					SD in Original Scale	70.71
111											95% Percentile Bootstrap UCL	50.36
112											95% BCA Bootstrap UCL	68.11
113												
114				**Gamma Distribution Test with Detected Values Only**							**Data Distribution Test with Detected Values Only**	
115					k star (bias corrected)	0.209					**Data do not follow a Discernable Distribution (0.05)**	
116					Theta Star	106						
117					nu star	7.933						
118												
119					A-D Test Statistic	1.659					**Nonparametric Statistics**	
120					5% A-D Critical Value	0.885					Kaplan-Meier (KM) Method	
121					K-S Test Statistic	0.885					Mean	20.02
122					5% K-S Critical Value	0.22					SD	69
123				**Data not Gamma Distributed at 5% Significance Level**							SE of Mean	15.47
124											95% KM (t) UCL	46.7
125				**Assuming Gamma Distribution**							95% KM (z) UCL	45.47
126					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	46.63
127					Minimum	0					95% KM (bootstrap t) UCL	200.9
128					Maximum	326					95% KM (BCA) UCL	51.01
129					Mean	20.02					95% KM (Percentile Bootstrap) UCL	50.48
130					Median	0.0762					95% KM (Chebyshev) UCL	87.45
131					SD	70.71					97.5% KM (Chebyshev) UCL	116.6
132					k star	0.155					99% KM (Chebyshev) UCL	174
133					Theta star	129.2						
134					Nu star	6.507					**Potential UCLs to Use**	
135					AppChi2	1.904					99% KM (Chebyshev) UCL	174
136					95% Gamma Approximate UCL	68.41						
137					95% Adjusted Gamma UCL	75.76						
138	**Note: DL/2 is not a recommended method.**											
139												
140												
141	**4-iso-Propyltoluene**											
142												
143							**General Statistics**					
144					Number of Valid Samples	21					Number of Detected Data	18
145					Number of Unique Samples	18					Number of Non-Detect Data	3
146											Percent Non-Detects	14.29%
147												
148				**Raw Statistics**							**Log-transformed Statistics**	
149					Minimum Detected	0.0166					Minimum Detected	-4.098
150					Maximum Detected	56.2					Maximum Detected	4.029
151					Mean of Detected	4.703					Mean of Detected	-0.937
152					SD of Detected	13.14					SD of Detected	2.341
153					Minimum Non-Detect	0.00533					Minimum Non-Detect	-5.234
154					Maximum Non-Detect	0.00764					Maximum Non-Detect	-4.874
155												
156	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	3
157	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	18
158	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	14.29%
159												

	A	B	C	D	E	F	G	H	I	J	K	L
160	**UCL Statistics**											
161	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
162					Shapiro Wilk Test Statistic	0.394					Shapiro Wilk Test Statistic	0.899
163					5% Shapiro Wilk Critical Value	0.897					5% Shapiro Wilk Critical Value	0.897
164	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
165												
166	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
167					DL/2 Substitution Method						DL/2 Substitution Method	
168					Mean	4.031					Mean	-1.628
169					SD	12.24					SD	2.768
170					95% DL/2 (t) UCL	8.636					95% H-Stat (DL/2) UCL	205.1
171												
172					Maximum Likelihood Estimate(MLE) Method						Log ROS Method	
173					Mean	2.664					Mean in Log Scale	-1.694
174					SD	13.14					SD in Log Scale	2.875
175					95% MLE (t) UCL	7.61					Mean in Original Scale	4.031
176					95% MLE (Tiku) UCL	7.322					SD in Original Scale	12.24
177											95% Percentile Bootstrap UCL	8.942
178											95% BCA Bootstrap UCL	12.17
179												
180	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
181					k star (bias corrected)	0.271	**Data appear Lognormal at 5% Significance Level**					
182					Theta Star	17.37						
183					nu star	9.748						
184												
185					A-D Test Statistic	1.538	**Nonparametric Statistics**					
186					5% A-D Critical Value	0.85					Kaplan-Meier (KM) Method	
187					K-S Test Statistic	0.85					Mean	4.033
188					5% K-S Critical Value	0.222					SD	11.94
189	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	2.681
190											95% KM (t) UCL	8.657
191	**Assuming Gamma Distribution**										95% KM (z) UCL	8.443
192					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	8.634
193					Minimum	0					95% KM (bootstrap t) UCL	25.79
194					Maximum	56.2					95% KM (BCA) UCL	9.729
195					Mean	4.031					95% KM (Percentile Bootstrap) UCL	9.126
196					Median	0.0762					95% KM (Chebyshev) UCL	15.72
197					SD	12.24					97.5% KM (Chebyshev) UCL	20.78
198					k star	0.16					99% KM (Chebyshev) UCL	30.71
199					Theta star	25.26						
200					Nu star	6.702	**Potential UCLs to Use**					
201					AppChi2	2.009					99% KM (Chebyshev) UCL	30.71
202					95% Gamma Approximate UCL	13.45						
203					95% Adjusted Gamma UCL	14.86						
204	**Note: DL/2 is not a recommended method.**											
205												
206												
207	**Naphthalene**											
208												
209	**General Statistics**											
210					Number of Valid Samples	21					Number of Detected Data	20
211					Number of Unique Samples	20					Number of Non-Detect Data	1
212											Percent Non-Detects	4.76%

Raw Statistics		
Minimum Detected	0.00445	
Maximum Detected	9.91	
Mean of Detected	1.671	
SD of Detected	3.21	
Minimum Non-Detect	0.012	
Maximum Non-Detect	0.012	
Log-transformed Statistics		
Minimum Detected	-5.415	
Maximum Detected	2.294	
Mean of Detected	-1.503	
SD of Detected	2.254	
Minimum Non-Detect	-4.423	
Maximum Non-Detect	-4.423	
UCL Statistics		
Normal Distribution Test with Detected Values Only		
Shapiro Wilk Test Statistic	0.565	
5% Shapiro Wilk Critical Value	0.905	
Data not Normal at 5% Significance Level		
Assuming Normal Distribution		
DL/2 Substitution Method		
Mean	1.592	
SD	3.15	
95% DL/2 (t) UCL	2.778	
Maximum Likelihood Estimate(MLE) Method		
Mean	1.262	
SD	3.411	
95% MLE (t) UCL	2.546	
95% MLE (Tiku) UCL	2.483	
Gamma Distribution Test with Detected Values Only		
k star (bias corrected)	0.319	
Theta Star	5.243	
nu star	12.75	
A-D Test Statistic	1.239	
5% A-D Critical Value	0.837	
K-S Test Statistic	0.837	
5% K-S Critical Value	0.209	
Data not Gamma Distributed at 5% Significance Level		
Assuming Gamma Distribution		
Gamma ROS Statistics using Extrapolated Data		
Minimum	0	
Maximum	9.91	
Mean	1.592	
Median	0.0783	
SD	3.15	
k star	0.243	
Theta star	6.54	
Nu star	10.22	
AppChi2	4.081	
95% Gamma Approximate UCL	3.987	
Lognormal Distribution Test with Detected Values Only		
Shapiro Wilk Test Statistic	0.943	
5% Shapiro Wilk Critical Value	0.905	
Data appear Lognormal at 5% Significance Level		
Assuming Lognormal Distribution		
DL/2 Substitution Method		
Mean	-1.675	
SD	2.334	
95% H-Stat (DL/2) UCL	34.52	
Log ROS Method		
Mean in Log Scale	-1.686	
SD in Log Scale	2.353	
Mean in Original Scale	1.592	
SD in Original Scale	3.15	
95% Percentile Bootstrap UCL	2.778	
95% BCA Bootstrap UCL	2.974	
Data Distribution Test with Detected Values Only		
Data appear Lognormal at 5% Significance Level		
Nonparametric Statistics		
Kaplan-Meier (KM) Method		
Mean	1.592	
SD	3.074	
SE of Mean	0.688	
95% KM (t) UCL	2.779	
95% KM (z) UCL	2.724	
95% KM (jackknife) UCL	2.778	
95% KM (bootstrap t) UCL	3.638	
95% KM (BCA) UCL	2.756	
95% KM (Percentile Bootstrap) UCL	2.769	
95% KM (Chebyshev) UCL	4.592	
97.5% KM (Chebyshev) UCL	5.89	
99% KM (Chebyshev) UCL	8.44	
Potential UCLs to Use		
99% KM (Chebyshev) UCL	8.44	

266					95% Adjusted Gamma UCL	4.297						
267	**Note: DL/2 is not a recommended method.**											
268												
269	**o-Xylene**											
270												
271						**General Statistics**							
272						Number of Valid Samples	21				Number of Detected Data	18	
273						Number of Unique Samples	18				Number of Non-Detect Data	3	
274											Percent Non-Detects	14.29%	
275													
276						**Raw Statistics**					**Log-transformed Statistics**		
277						Minimum Detected	0.00112				Minimum Detected	-6.794	
278						Maximum Detected	29.6				Maximum Detected	3.388	
279						Mean of Detected	2.052				Mean of Detected	-1.873	
280						SD of Detected	6.903				SD of Detected	2.318	
281						Minimum Non-Detect	0.00533				Minimum Non-Detect	-5.234	
282						Maximum Non-Detect	0.697				Maximum Non-Detect	-0.361	
283													
284	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	16	
285	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	5	
286	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	76.19%	
287													
288						**UCL Statistics**							
289						**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**		
290						Shapiro Wilk Test Statistic	0.316				Shapiro Wilk Test Statistic	0.944	
291						5% Shapiro Wilk Critical Value	0.897				5% Shapiro Wilk Critical Value	0.897	
292						**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
293													
294						**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
295						DL/2 Substitution Method					DL/2 Substitution Method		
296						Mean	1.776				Mean	-2.215	
297						SD	6.402				SD	2.465	
298						95% DL/2 (t) UCL	4.185				95% H-Stat (DL/2) UCL	40.76	
299													
300						Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
301						**MLE yields a negative mean**					Mean in Log Scale	-2.346	
302											SD in Log Scale	2.505	
303											Mean in Original Scale	1.761	
304											SD in Original Scale	6.406	
305											95% Percentile Bootstrap UCL	4.578	
306											95% BCA Bootstrap UCL	5.984	
307													
308						**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**		
309						k star (bias corrected)	0.262				**Data appear Lognormal at 5% Significance Level**		
310						Theta Star	7.818						
311						nu star	9.449						
312													
313						A-D Test Statistic	1.824				**Nonparametric Statistics**		
314						5% A-D Critical Value	0.854				Kaplan-Meier (KM) Method		
315						K-S Test Statistic	0.854				Mean	1.764	
316						5% K-S Critical Value	0.222				SD	6.251	
317						**Data not Gamma Distributed at 5% Significance Level**					SE of Mean	1.404	
318											95% KM (t) UCL	4.185	

319	**Assuming Gamma Distribution**									95% KM (z) UCL		4.073
320	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		4.174
321					Minimum	0				95% KM (bootstrap t) UCL		24.61
322					Maximum	29.6				95% KM (BCA) UCL		4.688
323					Mean	1.759				95% KM (Percentile Bootstrap) UCL		4.487
324					Median	0.0685				95% KM (Chebyshev) UCL		7.882
325					SD	6.407				97.5% KM (Chebyshev) UCL		10.53
326					k star	0.16				99% KM (Chebyshev) UCL		15.73
327					Theta star	10.98						
328					Nu star	6.727				**Potential UCLs to Use**		
329					AppChi2	2.022				99% KM (Chebyshev) UCL		15.73
330				95% Gamma Approximate UCL		5.852						
331				95% Adjusted Gamma UCL		6.465						
332	**Note: DL/2 is not a recommended method.**											
333												
334												
335												
336	**Diesel Range Organics**											
337												
338	**General Statistics**											
339					Number of Valid Samples	10				Number of Detected Data		5
340					Number of Unique Samples	5				Number of Non-Detect Data		5
341					Number of Missing Values	11				Percent Non-Detects		50.00%
342												
343	**Raw Statistics**						**Log-transformed Statistics**					
344					Minimum Detected	68.5				Minimum Detected		4.227
345					Maximum Detected	2750				Maximum Detected		7.919
346					Mean of Detected	940.7				Mean of Detected		6.03
347					SD of Detected	1108				SD of Detected		1.612
348					Minimum Non-Detect	38.7				Minimum Non-Detect		3.656
349					Maximum Non-Detect	47.7				Maximum Non-Detect		3.865
350												
351	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		5
352	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		5
353	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		50.00%
354												
355	**UCL Statistics**											
356	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
357					Shapiro Wilk Test Statistic	0.85				Shapiro Wilk Test Statistic		0.908
358					5% Shapiro Wilk Critical Value	0.762				5% Shapiro Wilk Critical Value		0.762
359	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
360												
361	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
362					DL/2 Substitution Method					DL/2 Substitution Method		
363					Mean	481.4				Mean		4.559
364					SD	883.2				SD		1.888
365					95% DL/2 (t) UCL	993.3				95% H-Stat (DL/2) UCL		1539
366												
367					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
368	**MLE yields a negative mean**									Mean in Log Scale		3.655
369										SD in Log Scale		2.724
370										Mean in Original Scale		472.2
371										SD in Original Scale		888.5

372											95% Percentile Bootstrap UCL	960.4
373											95% BCA Bootstrap UCL	1138
374												
375	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
376					k star (bias corrected)	0.427	**Data appear Normal at 5% Significance Level**					
377					Theta Star	2202						
378					nu star	4.273						
379												
380					A-D Test Statistic	0.296	**Nonparametric Statistics**					
381					5% A-D Critical Value	0.699					Kaplan-Meier (KM) Method	
382					K-S Test Statistic	0.699					Mean	504.6
383					5% K-S Critical Value	0.367					SD	825.4
384	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	291.8
385											95% KM (t) UCL	1040
386	**Assuming Gamma Distribution**										95% KM (z) UCL	984.6
387					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	1002
388					Minimum	0					95% KM (bootstrap t) UCL	1671
389					Maximum	2750					95% KM (BCA) UCL	1486
390					Mean	470.4					95% KM (Percentile Bootstrap) UCL	1159
391					Median	34.25					95% KM (Chebyshev) UCL	1777
392					SD	889.6					97.5% KM (Chebyshev) UCL	2327
393					k star	0.111					99% KM (Chebyshev) UCL	3408
394					Theta star	4237						
395					Nu star	2.22	**Potential UCLs to Use**					
396					AppChi2	0.185					95% KM (t) UCL	1040
397					95% Gamma Approximate UCL	5654					95% KM (Percentile Bootstrap) UCL	1159
398					95% Adjusted Gamma UCL	7843						
399	**Note: DL/2 is not a recommended method.**											
400												
401												
402	**Gasoline Range Organics**											
403												
404	**General Statistics**											
405					Number of Valid Samples	10					Number of Detected Data	6
406					Number of Unique Samples	6					Number of Non-Detect Data	4
407					Number of Missing Values	11					Percent Non-Detects	40.00%
408												
409	**Raw Statistics**						**Log-transformed Statistics**					
410					Minimum Detected	1.92					Minimum Detected	0.652
411					Maximum Detected	126					Maximum Detected	4.836
412					Mean of Detected	32.67					Mean of Detected	2.435
413					SD of Detected	49.31					SD of Detected	1.6
414					Minimum Non-Detect	1.15					Minimum Non-Detect	0.14
415					Maximum Non-Detect	2.22					Maximum Non-Detect	0.798
416												
417	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	5
418	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	5
419	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	50.00%
420												
421	**UCL Statistics**											
422	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
423					Shapiro Wilk Test Statistic	0.711					Shapiro Wilk Test Statistic	0.904
424					5% Shapiro Wilk Critical Value	0.788					5% Shapiro Wilk Critical Value	0.788

	A	B	C	D	E	F	G	H	I	J	K	L
425	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
426												
427	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
428	DL/2 Substitution Method						DL/2 Substitution Method					
429	Mean					19.94	Mean					1.386
430	SD					40.26	SD					1.812
431	95% DL/2 (t) UCL					43.28	95% H-Stat (DL/2) UCL					121.9
432												
433	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
434	**MLE yields a negative mean**						Mean in Log Scale					0.839
435							SD in Log Scale					2.387
436							Mean in Original Scale					19.69
437							SD in Original Scale					40.4
438							95% Percentile Bootstrap UCL					40.58
439							95% BCA Bootstrap UCL					52.36
440												
441	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
442	k star (bias corrected)					0.406	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
443	Theta Star					80.53						
444	nu star					4.869						
445												
446	A-D Test Statistic					0.566	**Nonparametric Statistics**					
447	5% A-D Critical Value					0.731	Kaplan-Meier (KM) Method					
448	K-S Test Statistic					0.731	Mean					20.37
449	5% K-S Critical Value					0.347	SD					37.99
450	**Data follow Appr. Gamma Distribution at 5% Significance Level**						SE of Mean					13.16
451							95% KM (t) UCL					44.49
452	**Assuming Gamma Distribution**						95% KM (z) UCL					42.02
453	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					42.99
454	Minimum					1.92	95% KM (bootstrap t) UCL					342.9
455	Maximum					126	95% KM (BCA) UCL					45.19
456	Mean					23.16	95% KM (Percentile Bootstrap) UCL					43.48
457	Median					7.217	95% KM (Chebyshev) UCL					77.73
458	SD					38.8	97.5% KM (Chebyshev) UCL					102.5
459	k star					0.577	99% KM (Chebyshev) UCL					151.3
460	Theta star					40.17						
461	Nu star					11.53	**Potential UCLs to Use**					
462	AppChi2					4.919	95% KM (BCA) UCL					45.19
463	95% Gamma Approximate UCL					54.29						
464	95% Adjusted Gamma UCL					63.67						
465	**Note: DL/2 is not a recommended method.**											
466												
467	**Naphthalene**											
468												
469	**General Statistics**											
470	Number of Valid Samples					11	Number of Detected Data					7
471	Number of Unique Samples					7	Number of Non-Detect Data					4
472							Percent Non-Detects					36.36%
473												
474	**Raw Statistics**						**Log-transformed Statistics**					
475	Minimum Detected					1.71	Minimum Detected					0.536
476	Maximum Detected					11.3	Maximum Detected					2.425
477	Mean of Detected					5.829	Mean of Detected					1.583

478					SD of Detected	3.589					SD of Detected	0.672
479					Minimum Non-Detect	0.67					Minimum Non-Detect	-0.4
480					Maximum Non-Detect	0.9					Maximum Non-Detect	-0.105
481												
482	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	4
483	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	7
484	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	36.36%
485												
486	**UCL Statistics**											
487	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
488					Shapiro Wilk Test Statistic	0.916					Shapiro Wilk Test Statistic	0.961
489					5% Shapiro Wilk Critical Value	0.803					5% Shapiro Wilk Critical Value	0.803
490	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
491												
492	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
493					DL/2 Substitution Method						DL/2 Substitution Method	
494					Mean	3.848					Mean	0.654
495					SD	3.91					SD	1.392
496					95% DL/2 (t) UCL	5.984					95% H-Stat (DL/2) UCL	15.58
497												
498					Maximum Likelihood Estimate(MLE) Method						Log ROS Method	
499					Mean	2.777					Mean in Log Scale	0.954
500					SD	5.107					SD in Log Scale	1.016
501					95% MLE (t) UCL	5.568					Mean in Original Scale	4.023
502					95% MLE (Tiku) UCL	5.857					SD in Original Scale	3.742
503											95% Percentile Bootstrap UCL	5.758
504											95% BCA Bootstrap UCL	6.04
505												
506	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
507					k star (bias corrected)	1.772	**Data appear Normal at 5% Significance Level**					
508					Theta Star	3.289						
509					nu star	24.81						
510												
511					A-D Test Statistic	0.228	**Nonparametric Statistics**					
512					5% A-D Critical Value	0.712					Kaplan-Meier (KM) Method	
513					K-S Test Statistic	0.712					Mean	4.331
514					5% K-S Critical Value	0.314					SD	3.31
515	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	1.078
516											95% KM (t) UCL	6.284
517	**Assuming Gamma Distribution**										95% KM (z) UCL	6.104
518					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	6.125
519					Minimum	1.71					95% KM (bootstrap t) UCL	7.168
520					Maximum	11.3					95% KM (BCA) UCL	7.021
521					Mean	4.874					95% KM (Percentile Bootstrap) UCL	6.36
522					Median	3.204					95% KM (Chebyshev) UCL	9.029
523					SD	3.08					97.5% KM (Chebyshev) UCL	11.06
524					k star	2.548					99% KM (Chebyshev) UCL	15.06
525					Theta star	1.913						
526					Nu star	56.05	**Potential UCLs to Use**					
527					AppChi2	39.84					95% KM (t) UCL	6.284
528					95% Gamma Approximate UCL	6.857					95% KM (Percentile Bootstrap) UCL	6.36
529					95% Adjusted Gamma UCL	7.261						
530	**Note: DL/2 is not a recommended method.**											

531												
532												
533	**o-Xylene**											
534												
535						**General Statistics**							
536						Number of Valid Samples	11				Number of Detected Data	7	
537						Number of Unique Samples	6				Number of Non-Detect Data	4	
538											Percent Non-Detects	36.36%	
539													
540						**Raw Statistics**					**Log-transformed Statistics**		
541						Minimum Detected	0.434				Minimum Detected	-0.835	
542						Maximum Detected	34.1				Maximum Detected	3.529	
543						Mean of Detected	6.743				Mean of Detected	0.945	
544						SD of Detected	12.15				SD of Detected	1.386	
545						Minimum Non-Detect	0.67				Minimum Non-Detect	-0.4	
546						Maximum Non-Detect	0.9				Maximum Non-Detect	-0.105	
547													
548	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	5	
549	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	6	
550	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	45.45%	
551													
552						**UCL Statistics**							
553						**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**		
554						Shapiro Wilk Test Statistic	0.563				Shapiro Wilk Test Statistic	0.941	
555						5% Shapiro Wilk Critical Value	0.803				5% Shapiro Wilk Critical Value	0.803	
556						**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
557													
558						**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
559						DL/2 Substitution Method					DL/2 Substitution Method		
560						Mean	4.43				Mean	0.248	
561						SD	9.942				SD	1.446	
562						95% DL/2 (t) UCL	9.863				95% H-Stat (DL/2) UCL	18.41	
563													
564						Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
565						**MLE yields a negative mean**					Mean in Log Scale	0.122	
566											SD in Log Scale	1.567	
567											Mean in Original Scale	4.389	
568											SD in Original Scale	9.961	
569											95% Percentile Bootstrap UCL	10.12	
570											95% BCA Bootstrap UCL	13.04	
571													
572						**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**		
573						k star (bias corrected)	0.459				**Data appear Gamma Distributed at 5% Significance Level**		
574						Theta Star	14.71						
575						nu star	6.42						
576													
577						A-D Test Statistic	0.688				**Nonparametric Statistics**		
578						5% A-D Critical Value	0.743				Kaplan-Meier (KM) Method		
579						K-S Test Statistic	0.743				Mean	4.449	
580						5% K-S Critical Value	0.325				SD	9.472	
581						**Data appear Gamma Distributed at 5% Significance Level**					SE of Mean	3.085	
582											95% KM (t) UCL	10.04	
583						**Assuming Gamma Distribution**					95% KM (z) UCL	9.523	

584	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		9.753
585					Minimum	0.434				95% KM (bootstrap t) UCL		39.39
586					Maximum	34.1				95% KM (BCA) UCL		10.58
587					Mean	4.623				95% KM (Percentile Bootstrap) UCL		10.28
588					Median	0.919				95% KM (Chebyshev) UCL		17.89
589					SD	9.859				97.5% KM (Chebyshev) UCL		23.71
590					k star	0.523				99% KM (Chebyshev) UCL		35.14
591					Theta star	8.834						
592					Nu star	11.51	**Potential UCLs to Use**					
593					AppChi2	4.909				95% KM (BCA) UCL		10.58
594				95% Gamma Approximate UCL		10.84						
595				95% Adjusted Gamma UCL		12.59						
596	**Note: DL/2 is not a recommended method.**											
597												
598												
599	**C5-C8 Aliphatics**											
600												
601	**General Statistics**											
602				Number of Valid Samples		11				Number of Detected Data		4
603				Number of Unique Samples		4				Number of Non-Detect Data		7
604										Percent Non-Detects		63.64%
605												
606	**Raw Statistics**						**Log-transformed Statistics**					
607				Minimum Detected		13				Minimum Detected		2.565
608				Maximum Detected		85.7				Maximum Detected		4.451
609				Mean of Detected		33.18				Mean of Detected		3.17
610				SD of Detected		35.07				SD of Detected		0.864
611				Minimum Non-Detect		12				Minimum Non-Detect		2.485
612				Maximum Non-Detect		18				Maximum Non-Detect		2.89
613												
614	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		10
615	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		1
616	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		90.91%
617												
618	**UCL Statistics**											
619	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
620				Shapiro Wilk Test Statistic		0.684				Shapiro Wilk Test Statistic		0.768
621				5% Shapiro Wilk Critical Value		0.748				5% Shapiro Wilk Critical Value		0.748
622	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
623												
624	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
625				DL/2 Substitution Method						DL/2 Substitution Method		
626					Mean	16.61				Mean		2.399
627					SD	23.28				SD		0.781
628				95% DL/2 (t) UCL		29.33				95% H-Stat (DL/2) UCL		27.73
629												
630				Maximum Likelihood Estimate(MLE) Method		N/A				Log ROS Method		
631	**MLE method failed to converge properly**									Mean in Log Scale		1.936
632										SD in Log Scale		1.139
633										Mean in Original Scale		14.42
634										SD in Original Scale		24.32
635										95% Percentile Bootstrap UCL		27.89
636										95% BCA Bootstrap UCL		35.24

637												
638	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
639					k star (bias corrected)	0.58	**Data appear Lognormal at 5% Significance Level**					
640					Theta Star	57.18						
641					nu star	4.641						
642												
643					A-D Test Statistic	0.723	**Nonparametric Statistics**					
644					5% A-D Critical Value	0.662					Kaplan-Meier (KM) Method	
645					K-S Test Statistic	0.662					Mean	20.42
646					5% K-S Critical Value	0.399					SD	20.71
647	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	7.212
648											95% KM (t) UCL	33.49
649	**Assuming Gamma Distribution**										95% KM (z) UCL	32.28
650					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	31.24
651					Minimum	5.954					95% KM (bootstrap t) UCL	129.2
652					Maximum	85.7					95% KM (BCA) UCL	85.7
653					Mean	29.16					95% KM (Percentile Bootstrap) UCL	35.3
654					Median	17.8					95% KM (Chebyshev) UCL	51.85
655					SD	23.41					97.5% KM (Chebyshev) UCL	65.46
656					k star	1.554					99% KM (Chebyshev) UCL	92.18
657					Theta star	18.76						
658					Nu star	34.2	**Potential UCLs to Use**					
659					AppChi2	21.82					95% KM (t) UCL	33.49
660					95% Gamma Approximate UCL	45.69					95% KM (% Bootstrap) UCL	35.3
661					95% Adjusted Gamma UCL	N/A						
662	**Note: DL/2 is not a recommended method.**											
663												
664	**C9-C10 Aromatics (unadj.)**											
665												
666	**General Statistics**											
667					Number of Valid Samples	11					Number of Detected Data	8
668					Number of Unique Samples	8					Number of Non-Detect Data	3
669											Percent Non-Detects	27.27%
670												
671	**Raw Statistics**						**Log-transformed Statistics**					
672					Minimum Detected	86.4					Minimum Detected	4.459
673					Maximum Detected	1710					Maximum Detected	7.444
674					Mean of Detected	480.7					Mean of Detected	5.722
675					SD of Detected	538.8					SD of Detected	0.994
676					Minimum Non-Detect	13					Minimum Non-Detect	2.565
677					Maximum Non-Detect	18					Maximum Non-Detect	2.89
678												
679	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	3
680	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	8
681	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	27.27%
682												
683	**UCL Statistics**											
684	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
685					Shapiro Wilk Test Statistic	0.745					Shapiro Wilk Test Statistic	0.967
686					5% Shapiro Wilk Critical Value	0.818					5% Shapiro Wilk Critical Value	0.818
687	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
688												
689	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					

690				DL/2 Substitution Method						DL/2 Substitution Method		
691				Mean	351.6					Mean	4.708	
692				SD	502.1					SD	1.927	
693				95% DL/2 (t) UCL	626					95% H-Stat (DL/2) UCL	6123	
694												
695				Maximum Likelihood Estimate(MLE) Method						Log ROS Method		
696				Mean	243.2					Mean in Log Scale	5.043	
697				SD	603.2					SD in Log Scale	1.43	
698				95% MLE (t) UCL	572.9					Mean in Original Scale	356.5	
699				95% MLE (Tiku) UCL	583.7					SD in Original Scale	498.5	
700										95% Percentile Bootstrap UCL	601.5	
701										95% BCA Bootstrap UCL	692	
702												
703				**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**		
704				k star (bias corrected)	0.861					**Data appear Gamma Distributed at 5% Significance Level**		
705				Theta Star	558.4							
706				nu star	13.77							
707												
708				A-D Test Statistic	0.337					**Nonparametric Statistics**		
709				5% A-D Critical Value	0.732					Kaplan-Meier (KM) Method		
710				K-S Test Statistic	0.732					Mean	373.1	
711				5% K-S Critical Value	0.3					SD	464.3	
712				**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean	149.7	
713										95% KM (t) UCL	644.4	
714				**Assuming Gamma Distribution**						95% KM (z) UCL	619.3	
715				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	633.8	
716				Minimum	0.856					95% KM (bootstrap t) UCL	987.2	
717				Maximum	1710					95% KM (BCA) UCL	648.5	
718				Mean	349.8					95% KM (Percentile Bootstrap) UCL	651.7	
719				Median	156					95% KM (Chebyshev) UCL	1025	
720				SD	503.4					97.5% KM (Chebyshev) UCL	1308	
721				k star	0.338					99% KM (Chebyshev) UCL	1862	
722				Theta star	1035							
723				Nu star	7.437					**Potential UCLs to Use**		
724				AppChi2	2.414					95% KM (Chebyshev) UCL	1025	
725				95% Gamma Approximate UCL	1078							
726				95% Adjusted Gamma UCL	1318							
727	**Note: DL/2 is not a recommended method.**											
728												
729												
730	**C9-C12 Aliphatics**											
731												
732						**General Statistics**							
733				Number of Valid Samples	11					Number of Detected Data	8	
734				Number of Unique Samples	8					Number of Non-Detect Data	3	
735										Percent Non-Detects	27.27%	
736												
737				**Raw Statistics**						**Log-transformed Statistics**		
738				Minimum Detected	52.1					Minimum Detected	3.953	
739				Maximum Detected	1980					Maximum Detected	7.591	
740				Mean of Detected	433.2					Mean of Detected	5.45	
741				SD of Detected	637.1					SD of Detected	1.113	
742				Minimum Non-Detect	13					Minimum Non-Detect	2.565	

743				Maximum Non-Detect	18					Maximum Non-Detect	2.89
744												
745	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect	3
746	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected	8
747	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage	27.27%
748												
749	**UCL Statistics**											
750	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
751				Shapiro Wilk Test Statistic	0.601					Shapiro Wilk Test Statistic	0.947
752				5% Shapiro Wilk Critical Value	0.818					5% Shapiro Wilk Critical Value	0.818
753	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
754												
755	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
756				DL/2 Substitution Method						DL/2 Substitution Method	
757				Mean	317.1					Mean	4.51
758				SD	569					SD	1.86
759				95% DL/2 (t) UCL	628					95% H-Stat (DL/2) UCL	3869
760												
761				Maximum Likelihood Estimate(MLE) Method						Log ROS Method	
762				Mean	188.6					Mean in Log Scale	4.709
763				SD	675.9					SD in Log Scale	1.573
764				95% MLE (t) UCL	557.9					Mean in Original Scale	319.3
765				95% MLE (Tiku) UCL	567					SD in Original Scale	567.7
766										95% Percentile Bootstrap UCL	638.8
767										95% BCA Bootstrap UCL	824.2
768												
769	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
770				k star (bias corrected)	0.668		**Data appear Gamma Distributed at 5% Significance Level**					
771				Theta Star	648.3							
772				nu star	10.69							
773												
774				A-D Test Statistic	0.592		**Nonparametric Statistics**					
775				5% A-D Critical Value	0.738					Kaplan-Meier (KM) Method	
776				K-S Test Statistic	0.738					Mean	329.3
777				5% K-S Critical Value	0.302					SD	535.9
778	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean	172.7
779										95% KM (t) UCL	642.3
780	**Assuming Gamma Distribution**									95% KM (z) UCL	613.4
781				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	629.3
782				Minimum	0					95% KM (bootstrap t) UCL	1505
783				Maximum	1980					95% KM (BCA) UCL	679.5
784				Mean	315.1					95% KM (Percentile Bootstrap) UCL	655
785				Median	112					95% KM (Chebyshev) UCL	1082
786				SD	570.2					97.5% KM (Chebyshev) UCL	1408
787				k star	0.139					99% KM (Chebyshev) UCL	2048
788				Theta star	2263							
789				Nu star	3.062		**Potential UCLs to Use**					
790				AppChi2	0.391					95% KM (Chebyshev) UCL	1082
791				95% Gamma Approximate UCL	2467							
792				95% Adjusted Gamma UCL	3509							
793	**Note: DL/2 is not a recommended method.**											
794												
795												

	A	B	C	D	E	F	G	H	I	J	K	L
796	**C9-C12 Aliphatics (unadj.)**											
797												
798	**General Statistics**											
799	Number of Valid Samples					11	Number of Detected Data					8
800	Number of Unique Samples					8	Number of Non-Detect Data					3
801							Percent Non-Detects					27.27%
802												
803	**Raw Statistics**						**Log-transformed Statistics**					
804	Minimum Detected					176	Minimum Detected					5.17
805	Maximum Detected					3730	Maximum Detected					8.224
806	Mean of Detected					922	Mean of Detected					6.314
807	SD of Detected					1181	SD of Detected					1.02
808	Minimum Non-Detect					13	Minimum Non-Detect					2.565
809	Maximum Non-Detect					18	Maximum Non-Detect					2.89
810												
811	Note: Data have multiple DLs - Use of KM Method is recommended						Number treated as Non-Detect					3
812	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					8
813	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					27.27%
814												
815	**UCL Statistics**											
816	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
817	Shapiro Wilk Test Statistic					0.664	Shapiro Wilk Test Statistic					0.934
818	5% Shapiro Wilk Critical Value					0.818	5% Shapiro Wilk Critical Value					0.818
819	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
820												
821	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
822	DL/2 Substitution Method						DL/2 Substitution Method					
823	Mean					672.6	Mean					5.139
824	SD					1077	SD					2.188
825	95% DL/2 (t) UCL					1261	95% H-Stat (DL/2) UCL					29925
826												
827	Maximum Likelihood Estimate(MLE) Method						Log ROS Method					
828	Mean					432.1	Mean in Log Scale					5.625
829	SD					1290	SD in Log Scale					1.456
830	95% MLE (t) UCL					1137	Mean in Original Scale					682.6
831	95% MLE (Tiku) UCL					1157	SD in Original Scale					1070
832							95% Percentile Bootstrap UCL					1255
833							95% BCA Bootstrap UCL					1600
834												
835	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
836	k star (bias corrected)					0.779	**Data appear Gamma Distributed at 5% Significance Level**					
837	Theta Star					1183						
838	nu star					12.47						
839												
840	A-D Test Statistic					0.487	**Nonparametric Statistics**					
841	5% A-D Critical Value					0.734	Kaplan-Meier (KM) Method					
842	K-S Test Statistic					0.734	Mean					718.5
843	5% K-S Critical Value					0.301	SD					999.1
844	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					322
845							95% KM (t) UCL					1302
846	**Assuming Gamma Distribution**						95% KM (z) UCL					1248
847	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					1287
848	Minimum					0	95% KM (bootstrap t) UCL					2448

849					Maximum	3730					95% KM (BCA) UCL	1317
850					Mean	670.5					95% KM (Percentile Bootstrap) UCL	1311
851					Median	256					95% KM (Chebyshev) UCL	2122
852					SD	1078					97.5% KM (Chebyshev) UCL	2730
853					k star	0.138					99% KM (Chebyshev) UCL	3923
854					Theta star	4858						
855					Nu star	3.037					**Potential UCLs to Use**	
856					AppChi2	0.383					95% KM (Chebyshev) UCL	2122
857					95% Gamma Approximate UCL	5311						
858					95% Adjusted Gamma UCL	7560						
859	**Note: DL/2 is not a recommended method.**											
860												
861												
862	**2-Methylnaphthalene**											
863												
864	**General Statistics**											
865					Number of Valid Samples	11					Number of Detected Data	6
866					Number of Unique Samples	6					Number of Non-Detect Data	5
867											Percent Non-Detects	45.45%
868												
869	**Raw Statistics**						**Log-transformed Statistics**					
870					Minimum Detected	1.96					Minimum Detected	0.673
871					Maximum Detected	7.46					Maximum Detected	2.01
872					Mean of Detected	4.683					Mean of Detected	1.417
873					SD of Detected	2.306					SD of Detected	0.584
874					Minimum Non-Detect	0.56					Minimum Non-Detect	-0.58
875					Maximum Non-Detect	0.68					Maximum Non-Detect	-0.386
876												
877	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	5
878	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	6
879	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	45.45%
880												
881	**UCL Statistics**											
882	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
883					Shapiro Wilk Test Statistic	0.903					Shapiro Wilk Test Statistic	0.848
884					5% Shapiro Wilk Critical Value	0.788					5% Shapiro Wilk Critical Value	0.788
885	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
886												
887	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
888					DL/2 Substitution Method						DL/2 Substitution Method	
889					Mean	2.697					Mean	0.244
890					SD	2.805					SD	1.41
891					95% DL/2 (t) UCL	4.23					95% H-Stat (DL/2) UCL	8.722
892												
893					Maximum Likelihood Estimate(MLE) Method						Log ROS Method	
894					Mean	1.483					Mean in Log Scale	0.72
895					SD	4.153					SD in Log Scale	0.902
896					95% MLE (t) UCL	3.752					Mean in Original Scale	2.959
897					95% MLE (Tiku) UCL	4.161					SD in Original Scale	2.566
898											95% Percentile Bootstrap UCL	4.2
899											95% BCA Bootstrap UCL	4.393
900												
901	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					

902					k star (bias corrected)	2.159		**Data appear Normal at 5% Significance Level**				
903					Theta Star	2.169						
904					nu star	25.91						
905												
906					A-D Test Statistic	0.467		**Nonparametric Statistics**				
907					5% A-D Critical Value	0.7					Kaplan-Meier (KM) Method	
908					K-S Test Statistic	0.7					Mean	3.445
909					5% K-S Critical Value	0.333					SD	2.063
910	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.681
911											95% KM (t) UCL	4.68
912	**Assuming Gamma Distribution**										95% KM (z) UCL	4.566
913				Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL	4.606
914					Minimum	1.96					95% KM (bootstrap t) UCL	4.705
915					Maximum	7.46					95% KM (BCA) UCL	5.538
916					Mean	4.431					95% KM (Percentile Bootstrap) UCL	5.472
917					Median	4.128					95% KM (Chebyshev) UCL	6.416
918					SD	1.656					97.5% KM (Chebyshev) UCL	7.701
919					k star	5.283					99% KM (Chebyshev) UCL	10.23
920					Theta star	0.839						
921					Nu star	116.2		**Potential UCLs to Use**				
922					AppChi2	92.34					95% KM (t) UCL	4.68
923					95% Gamma Approximate UCL	5.577					95% KM (Percentile Bootstrap) UCL	5.472
924					95% Adjusted Gamma UCL	5.795						
925	**Note: DL/2 is not a recommended method.**											
926												
927												
928	**C11-C22 Aromatics**											
929												
930	**General Statistics**											
931					Number of Valid Samples	11					Number of Unique Samples	10
932												
933	**Raw Statistics**							**Log-transformed Statistics**				
934					Minimum	22.2					Minimum of Log Data	3.1
935					Maximum	1240					Maximum of Log Data	7.123
936					Mean	347.2					Mean of log Data	4.94
937					Median	154					SD of log Data	1.564
938					SD	410.3						
939					Coefficient of Variation	1.182						
940					Skewness	1.259						
941												
942	**Relevant UCL Statistics**											
943	**Normal Distribution Test**							**Lognormal Distribution Test**				
944					Shapiro Wilk Test Statistic	0.812					Shapiro Wilk Test Statistic	0.868
945					Shapiro Wilk Critical Value	0.85					Shapiro Wilk Critical Value	0.85
946	**Data not Normal at 5% Significance Level**							**Data appear Lognormal at 5% Significance Level**				
947												
948	**Assuming Normal Distribution**							**Assuming Lognormal Distribution**				
949					95% Student's-t UCL	571.4					95% H-UCL	3776
950	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	1253
951					95% Adjusted-CLT UCL	600.9					97.5% Chebyshev (MVUE) UCL	1626
952					95% Modified-t UCL	579.2					99% Chebyshev (MVUE) UCL	2359
953												
954	**Gamma Distribution Test**							**Data Distribution**				

	A	B	C	D	E	F	G	H	I	J	K	L
955					k star (bias corrected)	0.547	**Data appear Gamma Distributed at 5% Significance Level**					
956					Theta Star	635						
957					nu star	12.03						
958					Approximate Chi Square Value (.05)	5.247	**Nonparametric Statistics**					
959					Adjusted Level of Significance	0.0278					95% CLT UCL	550.7
960					Adjusted Chi Square Value	4.538					95% Jackknife UCL	571.4
961											95% Standard Bootstrap UCL	535.1
962					Anderson-Darling Test Statistic	0.614					95% Bootstrap-t UCL	662
963					Anderson-Darling 5% Critical Value	0.769					95% Hall's Bootstrap UCL	638.2
964					Kolmogorov-Smirnov Test Statistic	0.25					95% Percentile Bootstrap UCL	549.4
965					Kolmogorov-Smirnov 5% Critical Value	0.266					95% BCA Bootstrap UCL	580.4
966					**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	886.4
967											97.5% Chebyshev(Mean, Sd) UCL	1120
968					**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	1578
969					95% Approximate Gamma UCL	796.1						
970					95% Adjusted Gamma UCL	920.5						
971												
972					**Potential UCL to Use**						Use 95% Approximate Gamma UCL	796.1
973												
974												
975	**C19-C36 Aliphatics**											
976												
977					**General Statistics**							
978					Number of Valid Samples	11					Number of Unique Samples	11
979												
980					**Raw Statistics**						**Log-transformed Statistics**	
981					Minimum	13.1					Minimum of Log Data	2.573
982					Maximum	4870					Maximum of Log Data	8.491
983					Mean	1265					Mean of log Data	5.712
984					Median	660					SD of log Data	2.146
985					SD	1778						
986					Coefficient of Variation	1.406						
987					Skewness	1.506						
988												
989					**Relevant UCL Statistics**							
990					**Normal Distribution Test**						**Lognormal Distribution Test**	
991					Shapiro Wilk Test Statistic	0.724					Shapiro Wilk Test Statistic	0.923
992					Shapiro Wilk Critical Value	0.85					Shapiro Wilk Critical Value	0.85
993					**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
994												
995					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
996					95% Student's-t UCL	2237					95% H-UCL	127948
997					**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	7414
998					95% Adjusted-CLT UCL	2407					97.5% Chebyshev (MVUE) UCL	9809
999					95% Modified-t UCL	2278					99% Chebyshev (MVUE) UCL	14513
1000												
1001					**Gamma Distribution Test**						**Data Distribution**	
1002					k star (bias corrected)	0.389					**Data appear Gamma Distributed at 5% Significance Level**	
1003					Theta Star	3255						
1004					nu star	8.55						
1005					Approximate Chi Square Value (.05)	3.058					**Nonparametric Statistics**	
1006					Adjusted Level of Significance	0.0278					95% CLT UCL	2147
1007					Adjusted Chi Square Value	2.547					95% Jackknife UCL	2237

	A	B	C	D	E	F	G	H	I	J	K	L
1008											95% Standard Bootstrap UCL	2095
1009					Anderson-Darling Test Statistic	0.352					95% Bootstrap-t UCL	3501
1010					Anderson-Darling 5% Critical Value	0.791					95% Hall's Bootstrap UCL	2928
1011					Kolmogorov-Smirnov Test Statistic	0.151					95% Percentile Bootstrap UCL	2151
1012					Kolmogorov-Smirnov 5% Critical Value	0.271					95% BCA Bootstrap UCL	2342
1013					**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	3603
1014											97.5% Chebyshev(Mean, Sd) UCL	4614
1015					**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	6600
1016					95% Approximate Gamma UCL	3538						
1017					95% Adjusted Gamma UCL	4247						
1018												
1019					**Potential UCL to Use**						Use 95% Adjusted Gamma UCL	4247
1020												
1021												
1022	**C9-C18 Aliphatics**											
1023												
1024					**General Statistics**							
1025					Number of Valid Samples	11					Number of Unique Samples	11
1026												
1027					**Raw Statistics**						**Log-transformed Statistics**	
1028					Minimum	12.4					Minimum of Log Data	2.518
1029					Maximum	4380					Maximum of Log Data	8.385
1030					Mean	1380					Mean of log Data	5.762
1031					Median	396					SD of log Data	2.294
1032					SD	1682						
1033					Coefficient of Variation	1.219						
1034					Skewness	1.002						
1035												
1036					**Relevant UCL Statistics**							
1037					**Normal Distribution Test**						**Lognormal Distribution Test**	
1038					Shapiro Wilk Test Statistic	0.799					Shapiro Wilk Test Statistic	0.884
1039					Shapiro Wilk Critical Value	0.85					Shapiro Wilk Critical Value	0.85
1040					**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
1041												
1042					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
1043					95% Student's-t UCL	2299					95% H-UCL	310007
1044					**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	10190
1045					95% Adjusted-CLT UCL	2378					97.5% Chebyshev (MVUE) UCL	13524
1046					95% Modified-t UCL	2325					99% Chebyshev (MVUE) UCL	20074
1047												
1048					**Gamma Distribution Test**						**Data Distribution**	
1049					k star (bias corrected)	0.382					**Data appear Gamma Distributed at 5% Significance Level**	
1050					Theta Star	3616						
1051					nu star	8.396						
1052					Approximate Chi Square Value (.05)	2.966					**Nonparametric Statistics**	
1053					Adjusted Level of Significance	0.0278					95% CLT UCL	2214
1054					Adjusted Chi Square Value	2.466					95% Jackknife UCL	2299
1055											95% Standard Bootstrap UCL	2172
1056					Anderson-Darling Test Statistic	0.432					95% Bootstrap-t UCL	2655
1057					Anderson-Darling 5% Critical Value	0.793					95% Hall's Bootstrap UCL	2405
1058					Kolmogorov-Smirnov Test Statistic	0.157					95% Percentile Bootstrap UCL	2241
1059					Kolmogorov-Smirnov 5% Critical Value	0.271					95% BCA Bootstrap UCL	2326
1060					**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	3590

	A	B	C	D	E	F	G	H	I	J	K	L
1061										97.5% Chebyshev(Mean, Sd) UCL		4547
1062	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL		6426
1063				95% Approximate Gamma UCL		3906						
1064				95% Adjusted Gamma UCL		4699						
1065												
1066	**Potential UCL to Use**									Use 95% Adjusted Gamma UCL		4699
1067	**Recommended UCL exceeds the maximum observation**											
1068												

APPENDIX L

TECHNICAL MEMORANDUM
RISK CHARACTERIZATION – RESIDENTIAL LAND USE

TECHNICAL MEMORANDUM
RISK CHARACTERIZATION – RESIDENTIAL LAND USE
SITE 04 – POTENTIAL PAST DISPOSAL AREA, LINCOLN, RI AMSA 68(G)

December 19, 2007

This technical memorandum presents a human health risk characterization for Site 04 – Potential Past Disposal Area (PDA) (the Site) located at the Lincoln, Rhode Island Area Maintenance Support Facility (AMSA) 68(G) to characterize health risks associated with a hypothetical unrestricted residential land use of the Site. A human health risk assessment (HHRA), performed in accordance with CERCLA, the NCP, and applicable USEPA guidance, has been performed for the Site. The HHRA is presented in the Draft Remedial Investigation Report for the Site prepared in September 2007 by MACTEC and KEMRON (KEMRON/MACTEC, 2007). The HHRA characterized health risks associated with exposure to chemicals of potential concern (COPCs) in soil associated with current military and future military or commercial/industrial use. The results of the HHRA indicated that health risks for these land uses were a cumulative cancer risk value below the lower bound of the USEPA cancer risk range of $1x10^{-6}$ to $1x10^{-4}$ and a hazard index equal to 1.

The objective of this remedial investigation addendum risk characterization is to determine if health risks associated with unrestricted (residential) land use exposures to the Site would exceed the USEPA cancer risk range or a hazard index of 1. This information will be used to determine if land use controls (LUCs) are required for the Site.

The results of this risk characterization indicate that cancer risks for residential land use are below the USEPA cancer risk range of $1x10^{-6}$ to $1x10^{-4}$, but the hazard index is greater than the threshold value of 1. Therefore, LUCs are required for this Site.

Methodology
This risk characterization is performed using the same methodology as described in the HRHA for Site 04. Specifically, the same data sets, COPCs, exposure point concentrations (EPCs), toxicity data, and risk characterization methods as described and provided in the HHRA for Site 04 are used. This risk characterization only differs from the HHRA for Site 04 in the receptor exposure scenario selected for evaluation, the quantitative exposure parameters, and the risk characterization results. These elements are described in the technical memorandum.

Residential Exposure Scenario
The residential exposure scenario considers use of the Site for the location of a single family residence, whereby children and adults living at the residence may be exposed to COPCs in soil by incidental ingestion, dermal contact, and inhalation of soil-derived vapors and dust. In addition, these receptors may be exposed to COPCs in groundwater via inhalation of vapors that may migrate from the groundwater to air within a residence (single family house). Consistent with USEPA guidance, the residential exposure scenario is evaluated by considering exposures to young child (ages 1 through 6) and adult populations. Exposure parameters are provided in Table 1 (child resident) and Table 2 (adult resident). In summary, the residential exposure scenario considers exposures to soil 350 days per year over a 30-year period. Soil ingestion rates include 200 milligrams per day (mg/day) for children and 100 mg/day for adults. Dermal contact rates include a contact area of 2,800 square centimeters (cm^2) for children and 5,700 cm^2 for adults, and a soil adherence factor of 0.2 mg/cm^2 for children and 0.07 mg/cm^2 for adults. Dust and vapor inhalation consider receptors to be outdoors eight hours per day. Inhalation of vapors that

may migrate from the groundwater to air within a residential dwelling is evaluated assuming that residents are indoors 24 hours per day, 350 days per year.

In the HHRA for Site 04, indoor air EPCs for inhalation of vapors that may migrate from groundwater to indoor air were calculated using the Johnson-Ettinger fate and transport model. The indoor air EPCs calculated using that model required modification for application to the residential scenario, to account for a potentially lower building air exchange rate of 0.25 changes per hour versus the value of 1 change per hour that was used in the Site 04 HHRA. Therefore, the indoor air EPCs derived in the Site 04 HHRA were multiplied by a factor of four to estimate risks for the residential exposure scenario.

Risk Characterization

Cancer and non-cancer risks to child and adult residential receptors are calculated for the COPCs, using the EPCs, cancer slope factor, and reference dose values presented in the Site 04 HHRA. Tables 3 and 4 present the COPCs, EPCs, dose-response values, and corresponding calculated intakes, cancer risks, and non-cancer risks for child and adult residential receptors. The risks are calculated using the exposure parameters provided in Tables 1 and 2.

The risk characterization results for residential exposure to soil at Site 04 are as follows:

Exposure Route	Cancer Risk (ELCR)	Non-Cancer Risk (HI)
Child Resident		
Soil Ingestion	NC	0.1
Soil Dermal	NC	0.007
Soil Dust inhalation	NC	0.00003
Soil Vapor inhalation	$8x10^{-9}$	4.0
Groundwater Vapor Inhalation		0.005
Total – Child Resident [a]	$8x10^{-9}$	4.0
Adult Resident		
Ingestion	NC	0.01
Dermal	NC	0.001
Dust inhalation	NC	0.00002
Soil Vapor inhalation	$2x10^{-8}$	2.0
Groundwater Vapor Inhalation		0.003
Total – Adult Resident [a]	$2x10^{-8}$	2.0
Cumulative Risk - Resident	$3x10^{-8}$	4.0

[a] – totals reflect rounding

The cumulative cancer risk value is below the USEPA cancer risk range of $1x10^{-6}$ to $1x10^{-4}$. The cumulative hazard index is greater than the threshold value of 1, due to inhalation of volatiles that may migrate from soil to ambient air.

The HHRA demonstrates that the cumulative cancer risk meets the USEPA risk management criteria. However, the hazard index excess a value of 1. Therefore, health risks associated with unrestricted residential land use of the Site exceed USEPA risk management criteria, and LUCs are required to prohibit residential land use of the Site.

Table 1
Values Used for Daily Intake Calculations Reasonable Maximum Exposure - Future Land Use - Child Resident

Site 04 - Potential Past Disposal Area
Lincoln, Rhode Island

Exposure Route	Receptor Population	Receptor Age	Exposure Points	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation / Model Name
Soil Ingestion	Resident	Child	Site 04	CS-c	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 2002a	CHEMICAL INTAKE-INGESTION (mg/kg-day)=
				IR-S	Ingestion Rate of Soil	200	mg/day	USEPA, 1991	CS-c x IR-S x FI x EF x ED x CF1 x 1/BW x 1/AT
				FI	Fraction Ingested	1	unitless	Assumption	
				EF	Exposure Frequency	350	day/yr	USEPA, 2004	
				ED	Exposure Duration	6	yr	USEPA, 2004	
				BW	Body Weight	70	kg	USEPA, 2004	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2190	day	USEPA, 1989 / equal to ED	
				CF1	Conversion Factor	1.E-06	kg/mg		
Soil Dermal	Resident	Child	Site 04	CS	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 2002a	INTAKE-DERMAL (mg/kg-day) =
				DAevent	Dose Absorbed Per Event	chemical-specific	mg/cm^2-event	USEPA, 2004	DAevent x SA x EF x ED x EV x 1/BW x 1/AT
				SA	Skin Surface Area Available for Contact	2800	cm^2	USEPA, 2004	
				EF	Exposure Frequency	350	day/yr	USEPA, 2004	Where DAevent =
				ED	Exposure Duration	6	yr	USEPA, 2004	CS x AF x ABSd x CF
				EV	Events per Day	1	event/day	USEPA, 2004	
				AF	Adherence Factor	0.2	mg/cm^2-event	USEPA, 2004	
				ABSd	Dermal Absorption Factor	chemical-specific	unitless	USEPA, 2004	
				BW	Body Weight	70	kg	USEPA, 2004	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2190	day	USEPA, 1989 / equal to ED	
				CF	Conversion Factor	1E-06	kg/mg		
Soil Dust Inhalation	Resident	Child	Site 04	CS-c	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 2002a	CHEMICAL INTAKE-INHALATION (ug/m³) =
				CAair-dust	Concentration in Air - Dust	95% UCL	ug/m^3	Modeled from soil	CAair x ED x EFx ET x 1/AT
				EF	Exposure Frequency - outdoor	350	day/yr	USEPA, 2004	CAair-dust=
				ED	Exposure Duration	6	yr	USEPA, 2004	CS-c x 1/PEF x 1000 ug/mg
				ET	Exposure Time	0.33	hr/hr	8 hours/day	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2190	day	USEPA, 1989 / equal to ED	
				PEF	Particulate Emission Factor	1.16E+09	m^3/kg	USEPA, 2002b	
Soil Vapor Inhalation	Resident	Child	Site 04	CS-c	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 2002a	CHEMICAL INTAKE-INHALATION (ug/m³) =
				CAair-vapor	Concentration in Air - Vapor	95% UCL	ug/m^3	Modeled from soil	CAair x ED x EFx ET x 1/AT
				EF	Exposure Frequency - outdoor	350	day/yr	USEPA, 2004	CAair-vapor=
				ED	Exposure Duration	6	yr	USEPA, 2004	CS-c x 1/VF x 1000 ug/mg
				ET	Exposure Time	0.33	hr/hr	8 hours/day	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2190	day	USEPA, 1989 / equal to ED	
				VF	Volatilization Factor	chemical-specific	m^3/kg	USEPA, 2002b	
Groundwater Vapor Inhalation	Resident	Child	Site 04	CS-gw	Chemical Concentration in Groundwater	Maximum	mg/L		CHEMICAL INTAKE-INHALATION (ug/m³) =
				CAair-vapor	Concentration in Air - Vapor	Maximum	ug/m^3	Modeled from groundwater [1]	CAair x ED x EFx ET x 1/AT
				EF	Exposure Frequency - indoor	350	day/yr	USEPA, 1991	
				ED	Exposure Duration	6	yr	USEPA, 1991	
				ET	Exposure Time	1	hr/hr	24 hours/day	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2190	day	USEPA, 1989 / equal to ED	

Table 1
Values Used for Daily Intake Calculations Reasonable Maximum Exposure - Future Land Use - Child Resident

Site 04 - Potential Past Disposal Area
Lincoln, Rhode Island

Exposure Route	Receptor Population	Receptor Age	Exposure Points	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation / Model Name

USEPA, 1989. "Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A)"; Office of Emergency and Remedial Response; EPA-540/1-89/002 (interim final); Washington, D.C., December.
USEPA, 1991. Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual Supplemental Guidance "Standard Default Exposure Factors". OSWER 9285.6-03. March.
USEPA, 2002a. "Calculating UpperConfidence Limits for Exposure Point Concentrations at Hazardous Waste Sites". OSWER 9285.6-10. December.
USEPA, 2002b. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December.
USEPA, 2004. "Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

[1] - Calculated using the Johnson-Ettinger Groundwater to Indoor Air Advanced Model (v. 3.1).

NA - Not Applicable
kg - kilograms
mg - milligrams
ug - micrograms
hr - hour
UCL - upper confidence limit
Prepared by: MH
cm^2 - square centimeters
m^3 - cubic meters
yr - year
Checked by: JHP

Table 2
Values Used for Daily Intake Calculations Reasonable Maximum Exposure - Future Land Use - Adult Resident

Site 04 - Potential Past Disposal Area
Lincoln, Rhode Island

Exposure Route	Receptor Population	Receptor Age	Exposure Points	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation / Model Name
Ingestion	Resident	Adult	Site 04	CS-c	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 2002a	CHEMICAL INTAKE-INGESTION (mg/kg-day)=
				IR-S	Ingestion Rate of Soil	100	mg/day	USEPA, 1991	CS-c x IR-S x FI x EF x ED x CF1 x 1/BW x 1/AT
				FI	Fraction Ingested	1	unitless	Assumption	
				EF	Exposure Frequency	350	day/yr	USEPA, 2004	
				ED	Exposure Duration	24	yr	USEPA, 2004	
				BW	Body Weight	70	kg	USEPA, 2004	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8760	day	USEPA, 1989 / equal to ED	
				CF1	Conversion Factor	1.E-06	kg/mg		
Dermal	Resident	Adult	Site 04	CS	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 2002a	INTAKE-DERMAL (mg/kg-day) =
				DAevent	Dose Absorbed Per Event	chemical-specific	mg/cm^2-event	USEPA, 2004	DAevent x SA x EF x ED x EV x 1/BW x 1/AT
				SA	Skin Surface Area Available for Contact	5700	cm^2	USEPA, 2004	
				EF	Exposure Frequency	350	day/yr	USEPA, 2004	Where DAevent =
				ED	Exposure Duration	24	yr	USEPA, 2004	CS x AF x ABSd x CF
				EV	Events per Day	1	event/day	USEPA, 2004	
				AF	Adherence Factor	0.2	mg/cm^2-event	USEPA, 2004	
				ABSd	Dermal Absorption Factor	chemical-specific	unitless	USEPA, 2004	
				BW	Body Weight	70	kg	USEPA, 2004	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8760	day	USEPA, 1989 / equal to ED	
				CF	Conversion Factor	1E-06	kg/mg		
Dust Inhalation	Resident	Adult	Site 04	CS-c	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 2002a	CHEMICAL INTAKE-INHALATION (ug/m^3) =
				CAair-dust	Concentration in Air - Dust	95% UCL	ug/m^3	Modeled from soil	CAair x ED x EFx ET x 1/AT
				EF	Exposure Frequency - outdoor	350	day/yr	USEPA, 2004	CAair-dust=
				ED	Exposure Duration	24	yr	USEPA, 2004	CS-c x 1/PEF x 1000 ug/mg
				ET	Exposure Time	0.33	hr/hr	8 hours/day	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8760	day	USEPA, 1989 / equal to ED	
				PEF	Particulate Emission Factor	1.16E+09	m^3/kg	USEPA, 2002b	
Vapor Inhalation	Resident	Adult	Site 04	CS-c	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 2002a	CHEMICAL INTAKE-INHALATION (ug/m^3) =
				CAair-vapor	Concentration in Air - Vapor	95% UCL	ug/m^3	Modeled from soil	CAair x ED x EFx ET x 1/AT
				EF	Exposure Frequency - outdoor	350	day/yr	USEPA, 2004	CAair-vapor=
				ED	Exposure Duration	24	yr	USEPA, 2004	CS-c x 1/VF x 1000 ug/mg
				ET	Exposure Time	0.33	hr/hr	8 hours/day	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8760	day	USEPA, 1989 / equal to ED	
				VF	Volatilization Factor	chemical-specific	m^3/kg	USEPA, 2002b	
Groundwater Vapor Inhalation	Resident	Adult	Site 04	CS-gw	Chemical Concentration in Groundwater	Maximum	mg/L		CHEMICAL INTAKE-INHALATION (ug/m^3) =
				CAair-vapor	Concentration in Air - Vapor	Maximum	ug/m^3	Modeled from groundwater [1]	CAair x ED x EFx ET x 1/AT
				EF	Exposure Frequency - indoor	350	day/yr	USEPA, 1991	
				ED	Exposure Duration	24	yr	USEPA, 1991	
				ET	Exposure Time	1	hr/hr	24 hours/day	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8760	day	USEPA, 1989 / equal to ED	

Table 2
Values Used for Daily Intake Calculations Reasonable Maximum Exposure - Future Land Use - Adult Resident

Site 04 - Potential Past Disposal Area
Lincoln, Rhode Island

Exposure Route	Receptor Population	Receptor Age	Exposure Points	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation / Model Name

USEPA, 1989. “Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A)”; Office of Emergency and Remedial Response; EPA-540/1-89/002 (interim final); Washington, D.C., December.

USEPA, 1991. Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual Supplemental Guidance "Standard Default Exposure Factors". OSWER 9285.6-03. March.

USEPA, 2002a. "Calculating UpperConfidence Limits for Exposure Point Concentrations at Hazardous Waste Sites". OSWER 9285.6-10. December.

USEPA, 2002b. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December.

USEPA, 2004. "Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

[1] - Calculated using the Johnson-Ettinger Groundwater to Indoor Air Advanced Model (v. 3.1).

NA - Not Applicable

kg - kilograms mg - milligrams ug - micrograms hr - hour UCL - upper confidence limit Prepared by: MH

cm^2 - square centimeters m^3 - cubic meters yr - year Checked by: JHP

TABLE 3
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- RESIDENT- CHILD
Site 04 - Potential Past Disposal Area
Lincoln, Rhode Island

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
GROUND WATER	AIR	PLUME - INDOOR AIR	INDOOR VAPOR INHALATION	1,2,4-Trimethylbenzene	0.533	mg/l	NC		NC			2.0E-02	ug/m3	6.0E+00	ug/m3	3.E-03
				1,3,5-Trimethylbenzene	0.196	mg/l	NC		NC			7.3E-03	ug/m3	6.0E+00	ug/m3	1.E-03
				4-iso-Propyltoluene	0.0223	mg/l	NC		NC					ND		
				Benzene	0.202	mg/l	1.1E-03	ug/m3	7.8E-06	(ug/m3)-1	8.E-09	1.2E-02	ug/m3	3.0E+01	ug/m3	4.E-04
				Isopropylbenzene	0.0243	mg/l	NC		NC			2.0E-03	ug/m3	4.0E+02	ug/m3	5.E-06
				Naphthalene	0.159	mg/l	NC		NC			6.4E-04	ug/m3	3.0E+00	ug/m3	2.E-04
				n-Butylbenzene	0.0306	mg/l	NC		NC			2.3E-03	ug/m3	ND		
				Propylbenzene	0.0476	mg/l	NC		NC			3.2E-03	ug/m3	ND		
			EXPOSURE ROUTE TOTAL								8.E-09					5.E-03
		EXPOSURE POINT TOTAL									8.E-09					5.E-03
	EXPOSURE MEDIUM TOTAL										8.E-09					5.E-03
GROUNDWATER TOTAL											**8.E-09**					**5.E-03**
SOIL	SOIL	SITE	INGESTION	1,2,4-Trimethylbenzene	156	mg/kg	NC		NC			2.0E-03	mg/kg/day	5.0E-02	mg/kg/day	4.E-02
				1,3,5-Trimethylbenzene	174	mg/kg	NC		NC			2.2E-03	mg/kg/day	5.0E-02	mg/kg/day	4.E-02
				4-iso-Propyltoluene	30.7	mg/kg	NC		NC			3.9E-04	mg/kg/day	ND		
				Naphthalene	8.44	mg/kg	NC		NC			1.1E-04	mg/kg/day	2.0E-02	mg/kg/day	5.E-03
				o-Xylene	15.7	mg/kg	NC		NC			2.0E-04	mg/kg/day	2.0E-01	mg/kg/day	1.E-03
				2-Methylnaphthalene	4.68	mg/kg	NC		NC			6.0E-05	mg/kg/day	4.0E-03	mg/kg/day	1.E-02
			EXPOSURE ROUTE TOTAL								--					1.E-01
			DERMAL	1,2,4-Trimethylbenzene	156	mg/kg	NC		NC			--		5.0E-02	mg/kg/day	
				1,3,5-Trimethylbenzene	174	mg/kg	NC		NC			--		5.0E-02	mg/kg/day	
				4-iso-Propyltoluene	30.7	mg/kg	NC		NC			--		ND		
				Naphthalene	8.44	mg/kg	NC		NC			3.9E-05	mg/kg/day	2.0E-02	mg/kg/day	2.E-03
				o-Xylene	15.7	mg/kg	NC		NC			--		2.0E-01	mg/kg/day	
				2-Methylnaphthalene	4.68	mg/kg	NC		NC			2.2E-05	mg/kg/day	4.0E-03	mg/kg/day	5.E-03
												--				
												--				
			EXPOSURE ROUTE TOTAL								--					7.E-03
		EXPOSURE POINT TOTAL									0.E+00					1.E-01
	EXPOSURE MEDIUM TOTAL										0.E+00					1.E-01
	AIR	DUST AT SITE	DUST INHALATION	1,2,4-Trimethylbenzene	156	mg/kg	NC		NC			8.2E-05	ug/m3	6.0E+00	ug/m3	1.E-05
				1,3,5-Trimethylbenzene	174	mg/kg	NC		NC			9.1E-05	ug/m3	6.0E+00	ug/m3	2.E-05
				4-iso-Propyltoluene	30.7	mg/kg	NC		NC			1.6E-05	ug/m3	ND		
				Naphthalene	8.44	mg/kg	NC		NC			4.4E-06	ug/m3	3.0E+00	ug/m3	1.E-06
				o-Xylene	15.7	mg/kg	NC		NC			8.2E-06	ug/m3	1.0E+02	ug/m3	8.E-08
				2-Methylnaphthalene	4.68	mg/kg	NC		NC			2.5E-06	ug/m3	ND		
			EXPOSURE ROUTE TOTAL								--					3.E-05
		EXPOSURE POINT TOTAL									0.E+00					3.E-05
	AIR	AMBIENT VAPORS AT SITE	AMBIENT VAPOR INHALATION	1,2,4-Trimethylbenzene	156	mg/kg	NC		NC			6.8E+00	ug/m3	6.0E+00	ug/m3	1.E+00
				1,3,5-Trimethylbenzene	174	mg/kg	NC		NC			1.9E+01	ug/m3	6.0E+00	ug/m3	3.E+00
				4-iso-Propyltoluene	30.7	mg/kg	NC		NC					ND		
				Naphthalene	8.44	mg/kg	NC		NC			1.7E-01	ug/m3	3.0E+00	ug/m3	6.E-02
				o-Xylene	15.7	mg/kg	NC		NC			2.2E+00	ug/m3	1.0E+02	ug/m3	2.E-02
				2-Methylnaphthalene	4.68	mg/kg	NC		NC			9.3E-02	ug/m3	ND		
			EXPOSURE ROUTE TOTAL								--					4.E+00
		EXPOSURE POINT TOTAL									0.E+00					4.E+00
	EXPOSURE MEDIUM TOTAL										0.E+00					4.E+00
SOIL TOTAL											**0.E+00**					**4.E+00**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**
											8.E-09					**4.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
NV - Not volatile; exposure route not complete for this chemical.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: MH
Checked by: JHP

TABLE 4
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- RESIDENT- ADULT
Site 04 - Potential Past Disposal Area
Lincoln, Rhode Island

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
GROUND WATER	AIR	PLUME - INDOOR AIR	INDOOR VAPOR INHALATION	1,2,4-Trimethylbenzene	0.533	mg/l	NC		NC			1.1E-02	ug/m3	6.0E+00	ug/m3	2.E-03
				1,3,5-Trimethylbenzene	0.196	mg/l	NC		NC			3.8E-03	ug/m3	6.0E+00	ug/m3	6.E-04
				4-iso-Propyltoluene	0.0223	mg/l	NC		NC					ND		
				Benzene	0.202	mg/l	2.2E-03	ug/m3	7.8E-06	(ug/m3)-1	2.E-08	6.5E-03	ug/m3	3.0E+01	ug/m3	2.E-04
				Isopropylbenzene	0.0243	mg/l	NC		NC			1.1E-03	ug/m3	4.0E+02	ug/m3	3.E-06
				Naphthalene	0.159	mg/l	NC		NC			3.4E-04	ug/m3	3.0E+00	ug/m3	1.E-04
				n-Butylbenzene	0.0306	mg/l	NC		NC			1.2E-03	ug/m3	ND		
				Propylbenzene	0.0476	mg/l	NC		NC			1.7E-03	ug/m3	ND		
			EXPOSURE ROUTE TOTAL								2.E-08					3.E-03
		EXPOSURE POINT TOTAL									2.E-08					3.E-03
	EXPOSURE MEDIUM TOTAL										2.E-08					3.E-03
GROUNDWATER TOTAL											**2.E-08**					**3.E-03**
SOIL	SOIL	SITE	INGESTION	1,2,4-Trimethylbenzene	156	mg/kg	NC		NC			2.1E-04	mg/kg/day	5.0E-02	mg/kg/day	4.E-03
				1,3,5-Trimethylbenzene	174	mg/kg	NC		NC			2.4E-04	mg/kg/day	5.0E-02	mg/kg/day	5.E-03
				4-iso-Propyltoluene	30.7	mg/kg	NC		NC			4.2E-05	mg/kg/day	ND		
				Naphthalene	8.44	mg/kg	NC		NC			1.2E-05	mg/kg/day	2.0E-02	mg/kg/day	6.E-04
				o-Xylene	15.7	mg/kg	NC		NC			2.2E-05	mg/kg/day	2.0E-01	mg/kg/day	1.E-04
				2-Methylnaphthalene	4.68	mg/kg	NC		NC			6.4E-06	mg/kg/day	4.0E-03	mg/kg/day	2.E-03
			EXPOSURE ROUTE TOTAL								--					1.E-02
			DERMAL	1,2,4-Trimethylbenzene	156	mg/kg	NC		NC			--		5.0E-02	mg/kg/day	
				1,3,5-Trimethylbenzene	174	mg/kg	NC		NC			--		5.0E-02	mg/kg/day	
				4-iso-Propyltoluene	30.7	mg/kg	NC		NC			--		ND		
				Naphthalene	8.44	mg/kg	NC		NC			6.0E-06	mg/kg/day	2.0E-02	mg/kg/day	3.E-04
				o-Xylene	15.7	mg/kg	NC		NC			--		2.0E-01	mg/kg/day	
				2-Methylnaphthalene	4.68	mg/kg	NC		NC			3.3E-06	mg/kg/day	4.0E-03	mg/kg/day	8.E-04
												--				
												--				
			EXPOSURE ROUTE TOTAL								--					1.E-03
		EXPOSURE POINT TOTAL									0.E+00					1.E-02
	EXPOSURE MEDIUM TOTAL										0.E+00					1.E-02
	AIR	DUST AT SITE	DUST INHALATION	1,2,4-Trimethylbenzene	156	mg/kg	NC		NC			4.3E-05	ug/m3	6.0E+00	ug/m3	7.E-06
				1,3,5-Trimethylbenzene	174	mg/kg	NC		NC			4.8E-05	ug/m3	6.0E+00	ug/m3	8.E-06
				4-iso-Propyltoluene	30.7	mg/kg	NC		NC			8.5E-06	ug/m3	ND		
				Naphthalene	8.44	mg/kg	NC		NC			2.3E-06	ug/m3	3.0E+00	ug/m3	8.E-07
				o-Xylene	15.7	mg/kg	NC		NC			4.3E-06	ug/m3	1.0E+02	ug/m3	4.E-08
				2-Methylnaphthalene	4.68	mg/kg	NC		NC			1.3E-06	ug/m3	ND		
			EXPOSURE ROUTE TOTAL								--					2.E-05
		EXPOSURE POINT TOTAL									0.E+00					2.E-05
	AIR	AMBIENT VAPORS AT SITE	AMBIENT VAPOR INHALATION	1,2,4-Trimethylbenzene	156	mg/kg	NC		NC			3.6E+00	ug/m3	6.0E+00	ug/m3	6.E-01
				1,3,5-Trimethylbenzene	174	mg/kg	NC		NC			9.8E+00	ug/m3	6.0E+00	ug/m3	2.E+00
				4-iso-Propyltoluene	30.7	mg/kg	NC		NC					ND		
				Naphthalene	8.44	mg/kg	NC		NC			8.8E-02	ug/m3	3.0E+00	ug/m3	3.E-02
				o-Xylene	15.7	mg/kg	NC		NC			1.2E+00	ug/m3	1.0E+02	ug/m3	1.E-02
				2-Methylnaphthalene	4.68	mg/kg	NC		NC			4.9E-02	ug/m3	ND		
			EXPOSURE ROUTE TOTAL								--					2.E+00
		EXPOSURE POINT TOTAL									0.E+00					2.E+00
	EXPOSURE MEDIUM TOTAL										0.E+00					2.E+00
SOIL TOTAL											**0.E+00**					**2.E+00**
										TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**2.E-08**	**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**				**2.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
NV - Not volatile; exposure route not complete for this chemical.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: MH
Checked by: JHP

APPENDIX M

RESPONSE TO RIDEM COMMENTS ON DRAFT FINAL REMEDIAL INVESTIGATION REPORT

Response to Comments on the December 19, 2007 Remedial Investigation Report
Site 04 – Potential Past Disposal Area
AMSA 68 (G) USAR; Lincoln, Rhode Island
Contract No. W911SO-04-F0017

Reference: **Letter from Mr. Timothy M. Fleury (RIDEM) to Mr. Ira Silverberg (94th RRC); dated February 29, 2008; AMSA 68 (G) USAR Site 04 Potential Past Disposal Area – Draft Final Remedial Investigation Report (December 19, 2007)**

General Response from the U.S. Army Environmental Command:

In establishing the Defense Environmental Restoration Program (10 U.S.C. §§ 2701-2708 and 2810), Congress directed that Department of Defense environmental cleanup efforts be consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Additionally, CERCLA itself requires that cleanup efforts at federal facilities be conducted under CERCLA (42 U.S.C. § 9620). Due to these reasons, and in order to have a common framework for managing a national cleanup program, the Army uses CERCLA as the primary legislative authority for managing cleanup of its sites.

Under CERCLA Section 121, the Army must attain all state applicable or relevant and appropriate requirements (ARARs) for remedial actions required under CERCLA Sections 104 and 106. If a site is determined to be "no further action" because it poses no current or potential threat to human health or the environment based on the reasonably foreseeable land use, ARARs are not applicable. If a remedial action is required, only those state standards the state identifies in a timely manner and are more stringent than federal requirements may be ARARs. Because CERCLA remedial actions are exempt from permitting requirements, the Army may comply with only the substantive portions of ARARs. Administrative and procedural requirements are not ARARs.

For those reasons, the Army does not intend to follow the Rhode Island Department of Environmental Management (RIDEM) Remediation Regulations for Site 04 – Potential Past Disposal Area at the AMSA 68 (G) U.S. Army Reserve (USAR) facility in Lincoln, RI. A Draft Final Remedial Investigation (RI) Report for Site 04 concluded that there is no unacceptable risk to receptors based on current or reasonably foreseeable future land use. Thus, because there is no remedial action under CERCLA Sections 104 or 106, ARARs are not applicable. Moreover, even if remediation was necessary, the Army could only comply with those aspects of the RIDEM Remediation Regulations that are identified as ARARs. The Army cannot follow the procedural requirements of the RIDEM Remediation Regulations.

In following CERCLA, the Army will continue to provide you with copies of documents for your review. The Army appreciates technical review comments from your agency and we encourage your participation in the process. In the event your agency does not wish to review the CERCLA documents, please provide either a written letter or email acknowledgement of your decision. The Army is willing to provide the agency with a 30 day review period, but if the agency informs the Army it is not willing to review the documents, the Army will proceed under our CERCLA authority.

Office of Waste Management Comments

General Comments

1. The Office of Waste Management (OWM) assumes that all properties may be used for residential and/or recreational re-use, therefore comparing all analytical soils samples to the Residential Direct Exposure Criteria (RDEC). This RIR compares all soil values to the Industrial/Commercial Direct Exposure Criteria (ICDEC) even though there are concentrations (e.g. individual Polycyclic Aromatic Hydrocarbons (PARs) and Total Petroleum Hydrocarbons (TPH)) that are found to exceed the RDEC but not the ICDEC. Please provide reasoning as to why all samples were compared to the ICDEC rather than the RDEC and update all tables where soil samples exceed the RIDEM RDEC.

In addition, RIDEM's RDEC allows for unrestricted use of the property, whereas any other criteria will require, at a minimum, an Environmental Land Use Restriction (ELUR). An ELUR is only one of a number of remedial alternatives to be evaluated. It is understood that it is not the Military's policy to apply ELURs to federally owned properties. Therefore, if an ELUR is proposed as part of the remedy, the owner would have to provide assurance, in writing, that a.) The owner has the ability to record an ELUR on the deed, b.) Acknowledge RIDEM has the right to enter the property at reasonable times for the purpose of monitoring compliance with the remedial action (Remediation Regulations, Section 8.09) and c.) Acknowledge that RIDEM can take enforcement action to ensure implementation of the remedy. An ELUR will require annual reporting to the Department and a provision for oversite costs for review of annual reports. The ELUR would also not be a supplement to Land Use Controls (LUCs) but rather as part of a final remedy for the property, which shall carry on the deed for the property with all future property owners.

Therefore, additional excavation may be necessary in the areas revealing levels of PAHs and TPH above the Department's RDEC but below the Department's ICDEC unless a RIDEM approved ELUR is part of the final remedy. Please modify these changes for the work plan. If excavation is not feasible and if the contamination exceeding the RDEC is located beneath a form of engineered cap (e.g. asphalt) then an ELUR shall be recorded without any excavation being necessary.

Response: *The current land use of the Lincoln AMSA 68 (G) facility is as an active USAR installation. The future land use of the USAR property is assumed to continue to be non-residential (i.e., military or industrial/commercial). The response actions being conducted at Site 04 under the USAEC contract are based on current and reasonably foreseeable future land use, which as stated above is considered to be non-residential. Therefore, the data evaluation presented in the RI Report is based on a comparison to RIDEM Industrial/Commercial Direct Exposure Criteria.*

Appendix L of the RI Report contains a Technical Memorandum that presents a human health risk characterization for Site 04 to evaluate health risks associated with a hypothetical unrestricted residential land use scenario. The results of the risk characterization indicate that cancer risks for residential land use are below the USEPA cancer risk range of $1x10^{-6}$ to $1x10^{-4}$, but the HI exceeds the threshold value of 1. Therefore, land use controls required to prohibit residential use of the Site will be addressed in the Decision Document for Site 04 to be prepared by the U.S. Army.

Specific Comments

2. Pg. 22, Section 2.2.3.3 Groundwater Samples

The OWM does not recognize filtered groundwater samples as representing adequate site groundwater conditions. All unfiltered groundwater samples, not filtered samples, should be compared to the RIDEM GA groundwater objectives to determine if further groundwater issues exist. Numerous groundwater-monitoring wells exceeded the Department's GA Groundwater Objective of 0.015 mg/L for lead. Furthermore, dissolved groundwater samples analyzed for lead exhibited concentrations exceeding the RIDEM's GA Groundwater Objective, which is not attributable to suspended solids being the source of lead contamination in the groundwater sample. Please revise the remedial alternatives to include a remedy for the concentrations of lead exceeding the RIDEM's GA Groundwater Objectives.

This RIR has identified concentrations of Benzene and Naphthalene that exceed the RIDEM's GA Groundwater Objectives and in some cases the RIDEM's GB Groundwater Objectives. Please revise the remedial alternatives to include a remedy for the concentrations of Benzene and Naphthalene exceeding RIDEM's GA Groundwater Objectives. Some of these monitoring wells may be incorporated in the in situ chemical oxidation that is proposed for Site 05 (Former Gasoline UST) to break down the Benzene and Naphthalene concentrations if the chemical oxidation is applicable to those compounds, especially since levels of Benzene are being detected above the regulatory criteria in off site monitoring wells.

Response: *As indicated in Section 2.2.3.2 – Groundwater Samples of the RI Report:*

"Filtered sample lead concentrations were markedly lower, and were detected in twelve out of the fifteen groundwater samples in the 2006 investigation. Lead in filtered samples was not detected in samples from any of the seven direct-push explorations (GP-01 through GP-07) in the 2007 investigation. Concentrations of detected dissolved lead in filtered samples ranged from 0.00276 mg/L (MW-2) to 0.116 mg/L (SS-06), and exceed the GA GO of 0.015 mg/L in MW-15, SS-03, SS-05, and SS-06 (see Figure 2-5). Concentrations of lead in the filtered groundwater samples are significantly lower than those in the unfiltered samples, suggesting that the lead detected in the unfiltered samples is largely attributable to suspended solids."

A summary table of lead analytical data from monitoring well samples collected in January 2006 is presented below (complete data presented in Table 2-6 of the RI Report), with highlighted results indicating concentrations in excess of the GA GO of 0.015 mg/L:

	Filtered Result (Dissolved)	Unfiltered Result (Total)
MW-1	<0.001 (ND)	0.000429
MW-2	0.000397	0.0059
MW-8	<0.001 (ND)	0.00201
MW-14	<0.001 (ND)	0.0173
MW-15	0.0201	0.151

The table above indicates that the lead concentrations of the unfiltered results are all greater than the filtered results, supporting the theory that the elevated lead concentrations in the unfiltered samples are largely attributable to and associated with suspended solids. In addition, the results

from the unfiltered sample from MW-14 only slightly exceed the GA GO of 0.015 mg/L. Additional data from the Nobis RI Report indicates that (unfiltered) groundwater samples collected from monitoring wells MW-1, MW-2, and MW-8 in 2003 did not contain concentrations of lead greater than 0.005 mg/L.

As presented in Section 1.2 of the RI Report, GB criteria are applied to environmental media at the United States Army Reserve Center (USARC) property and immediately adjacent property to the north of the Site, because these properties overlie GB groundwater. The GA criteria are applied downgradient along the southeast side of Albion Road to help ensure that the groundwater contamination will not pose a substantial likelihood of exceeding the GA GO at the boundary between the GA and GB classified aquifers, which is interpreted to be the center line of Albion Road.

The Corrective Action Plan for Site 05 – Former Gasoline UST will propose installation of new monitoring wells downgradient from Albion Road and a groundwater monitoring program to help ensure that total (unfiltered) lead concentrations in groundwater will not pose a substantial likelihood of exceeding the GA GO at the boundary between the GA and GB classified aquifers, which is interpreted to be the center line of Albion Road.

The presence of benzene and naphthalene is likely attributable to contamination originating at Site 05 – Former Gasoline UST. The Corrective Action Plan for Site 05 – Former Gasoline UST will propose remedial action to address the presence of these compounds.

3. Pg. 95, Section 4.1 Summary and Conclusions Site 04 – PDA

Please note that the Department must assume an unrestricted residential scenario, involving children, for all future properties as the most restrictive scenario during risk assessments. Using this scenario, a hazard index of greater than one (1) was calculated, therefore, the USAEC must default to the RIDEM's Remediation Regulations and all other applicable RIDEM Regulations, if any. The Department does not concur with the decision of land use controls as being the only remedy for Site 04 given the soil concentrations of TPH and PAHs as well as the exceedances of the RIDEM GA Groundwater Objectives for specific Volatile Organic Compounds (VOCs).

Furthermore, the body weight used in Table 1 of Appendix L uses a value of 70 kg for the child resident scenario. This value is not consistent with Appendix D of the Remediation Regulations and a value of 15 kg should be used, which will alter the results of the risk characterization.

Response: *As stated in the Army's General Response, the Army does not intend to follow the RIDEM Remediation Regulations for Site 04 – Potential Past Disposal Area at the AMSA 68 (G) U.S. Army Reserve (USAR) facility in Lincoln, RI. The Draft Final Remedial Investigation (RI) Report for Site 04 concluded that there is no unacceptable risk to receptors based on current or reasonably foreseeable future land use. Thus, because there is no remedial action under CERCLA Sections 104 or 106, ARARs including RIDEM Remediation Regulations are not applicable.*

The body weight for the child listed in Table 1 is incorrect – it should be 15 kg. However, the calculations used the correct body weight of 15 kg. Therefore, the results and conclusions are correct – only the table that shows the exposure parameters is incorrect. The table will be edited to show the correct body weight of 15 kg used in the calculations.

4. Pg. 95, Section 4.2 Recommendations

The Remediation Regulations require the evaluation of three (3) remedial alternatives, one of which must be the no action alternative. The no action alternative is to be used as a baseline comparison against the other proposed remedies. Please revise the RIR to be in compliance with **Section 7.04 Development of Remedial Alternatives** of the Remediation Regulations. The USAEC must take into account the VOCs and lead in groundwater as well as all of the soil contamination exceeding the RIDEM's RDEC (TPH and PAHs). These alternatives may include excavation with off site disposal and compliance sampling, the incorporation of chemical oxidation with Site 05, installation of an engineered cap with an ELUR, or any other remedy in accordance with the Remediation Regulations.

Response: *As stated in the Army's General Response, the Army does not intend to follow the RIDEM Remediation Regulations for Site 04 – Potential Past Disposal Area at the AMSA 68 (G) U.S. Army Reserve (USAR) facility in Lincoln, RI. The Draft Final Remedial Investigation (RI) Report for Site 04 concluded that there is no unacceptable risk to receptors based on current or reasonably foreseeable future land use. Thus, because there is no remedial action under CERCLA Sections 104 or 106, ARARs including RIDEM Remediation Regulations are not applicable.*